UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO: **MA0101010**

PUBLIC NOTICE START AND END DATES: February 20, 2015 – April 20, 2015

NAME AND ADDRESS OF APPLICANT:

City of Brockton
City Hall, 45 School Street
Brockton, Massachusetts 02401

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Brockton Advanced Water Reclamation Facility
303 Oak Hill Way
Brockton, Massachusetts 02301

The municipalities of Abington and Whitman are co-permittees for specific activities required by the permit, as set forth in Section VIII of this Fact Sheet and Sections 1.B and 1.C. of the Draft Permit. The responsible municipal departments are:

Town of Abington	**Town of Whitman**
Sewer Department	**Department of Public Works**
350 Summer Street	**100 Essex Street, P.O. Box 454**
Abington, MA 02351	**Whitman, MA 02382**

RECEIVING WATER: **Salisbury Plain River** (Taunton River Basin - MA62)

CLASSIFICATION: **Class B**

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I. PROPOSED ACTION, TYPE OF FACILITY AND DISCHARGE LOCATION

The above named applicant has applied to the U.S. Environmental Protection Agency for the re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The current permit was issued on May 11, 2005. The permit expired in 2010 and has been administratively continued pursuant to 40 C.F.R. 122.6.

The Brockton Advanced Water Reclamation Facility is an advanced secondary treatment plant that was originally constructed in 1963 with a design flow of 18 mgd. The facility has received a major upgrade since the issuance of the current permit to provide for improved nutrient removal, maintain permit compliance and extend facility life. According to the City this upgrade has increased the capacity of the facility to 20.49 mgd (See Application form 2A, Section A.6.), although the City has not received authorization for increased flow pursuant to the state antidegradation policy (see discussion in Section VI.B.1 below). The treatment plant discharges to the Salisbury Plain River (Outfall 001). See Figure 1 (attached).

The treatment plant and the Brockton collection system are owned by the City of Brockton and are currently operated under contract by Veolia Water. Veolia submitted the application for renewal of the NPDES permit as required by 40 CFR §122.22(b). The City shall be the sole permittee for the treatment plant consistent with other contract operated publicly owned treatment works (POTWs). The Towns of Abington and Whitman shall be co-permittees for their collection systems that discharge to the Brockton AWRF.

II. DESCRIPTION OF DISCHARGE

Quantitative descriptions of the discharge in terms of significant effluent parameters based on recent discharge monitoring reports (DMRs) for January 2011 through December 2013 may be found in Fact Sheet Table 1 (attached).

III. RECEIVING WATER DESCRIPTION

The receiving water, Salisbury Plain River, is classified as a Class B warm water fishery in the Massachusetts Surface Water Quality Standards, 314 CMR 4.05(4)(a). Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. The waters should have consistently good aesthetic value.

A warm water fishery is defined in the Massachusetts Surface Water Quality Standards (314 CMR 4.02) as water in which the maximum mean monthly temperature generally exceeds 20° Celsius during the summer months and are not capable of supporting a year-round population of cold water stenothermal aquatic life.

The Salisbury Plain River is an effluent dominated stream. The Brockton AWRF makes up over 95% of the flow in the Salisbury Plain River under 7Q10 conditions, and effluent-dominated conditions extend downstream through the Matfield (the Brockton AWRF flow is 50-90% of mean August flows at the former USGS streamgage site on the Matfield River in Bridgewater) and into the Taunton River in dry weather.

The segment of the Salisbury Plain River to which the Brockton AWRF discharges (segment 62-06) is listed in the Massachusetts 303(d) list for impairments to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor, turbidity and debris/floatables/trash (denoted ‘not a pollutant’; no TMDL required). The Salisbury Plain River joins Beaver Brook in East Bridgewater to form the Matfield River (segment 62-32), which is also listed in the 303(d) list (impairments due to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor). The Matfield River joins with the Town River in Bridgewater to become the Taunton River. The Taunton River from Bridgewater to the Route 24 bridge in Taunton is listed as attaining the Aquatic Life use, with other uses not assessed. The Taunton River is a designated Wild and Scenic River under 16 U.S.C. 1271-1287, and is the longest undammed river in Massachusetts. The Taunton River flows into Mount Hope Bay at Fall River; estuarine conditions extend upstream as far as the City of Taunton.

IV. LIMITATIONS AND CONDITIONS

The effluent limitations and monitoring requirements may be found in the draft NPDES permit.

V. PERMIT BASIS: STATUTORY AND REGULATORY AUTHORITY

The Clean Water Act (the “CWA”) prohibits the discharge of pollutants to waters of the United States without an NPDES permit unless such a discharge is otherwise authorized by the Act. A NPDES permit is used to implement technology-based and water quality-based effluent limitations as well as other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with statutory and regulatory authorities established pursuant to the Act. The regulations governing the NPDES program are found in 40 CFR Parts 122, 124 and 125.

Under Section 301(b)(1)(B) of the CWA, POTWs are required to achieve technology-based effluent limitations based upon secondary treatment. The secondary treatment requirements are set forth in 40 CFR Part 133 and define secondary treatment as an effluent achieving specific limitations for biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

Under Section 301(b)(1)(C) of the CWA, discharges are also subject to effluent limitations based on water quality standards. The MA SWQS, 314 CMR 4.00, include requirements for the regulation and control of toxic constituents and also require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site specific criteria is established. Massachusetts regulations similarly require that its permits contain limitations which are adequate to assure the attainment and maintenance of the water quality standards of the receiving waters as assigned in the MA SWQS, 314 CMR 4.00. See 314 CMR 3.11(3). Additionally, under 40 CFR §122.44 (d)(1)(i), "[l]imitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard."

VI. EXPLANATION OF THE PERMIT'S EFFLUENT LIMITATIONS

A. TREATMENT PROCESS AND COLLECTION SYSTEM DESCRIPTION

The Brockton AWRF is engaged in the collection and treatment of municipal wastewater, including industrial wastewater from nine non-categorical significant industrial users and six categorical industrial users (including sheet metal manufacturers and finishers and medical and pharmaceutical users). The facility provides advanced treatment, filtration and UV disinfection. Figure 2. The wastewater treatment processes are as follows:

At the headworks wastewater is screened and passes through grit removal, then flows to the influent pump station and a distribution structure to one of four primary clarification tanks. After settling in the primary clarifiers, the flow continues on through one of two parallel treatment trains. The North train consists of four aeration basins and three secondary clarifiers. The South treatment train consists of three aeration basins and three secondary clarifiers. Both sets of aeration basins were upgraded as of 2010 to a biological nitrogen removal system with chemical phosphorus removal. Flows to the south treatment train pass through the primary effluent lift station; in extremely high flow conditions primary effluent is also on occasion diverted directly from the primary effluent lift station to UV disinfection (secondary bypass; see restrictions on such practices at Draft Permit Part II.B.4). After settling in the secondary clarifiers, the flow is recombined at the Filter Building, containing four AquaDiamond cloth media filters and two sand filters. The effluent then flows to UV disinfection, and passes over a reaeration cascade to the Salisbury Plain River. Sludge is dewatered by centrifuge and incinerated on site.

The treatment process described reflects a treatment plant upgrade project completed in 2010. The upgrade included conversion of the existing aeration basins into a biological nitrogen removal system; replacement of sludge collection equipment in the primary clarifiers; expansion of the existing effluent filter capacity; installation of chemical systems to achieve chemical phosphorus removal; replacement of the sodium hypochlorite disinfection system with a new ultraviolet (UV) disinfection system; new electrical feed/distribution systems; and odor control systems.

The sewage collection system is entirely separate sanitary sewer. Table 2 below shows the number of households served in each municipality.

Table 2. Communities served

Town	Population served by AWRF
Brockton	90,000
Abington	10,000 (est)
Whitman	10,000 (est)

The collection system has historically been subject to extremely high wet weather flows due to infiltration and inflow (I/I) to the system. The City of Brockton has engaged in an extensive program to remove I/I from its system, and has been successful in reducing both peak flows and average annual flows to the AWRF.

The collection system and facility upgrade were performed pursuant to a judicial consent decree issued in September 2006; the work required under that decree has been completed and the judicial decree was terminated in March 2013. EPA also issued an administrative order in April 2006 relating to violations of the copper limit and establishing an interim limit of 20 ug/l. That order remains in effect but will be superseded by the new copper limits in the reissued permit (see Copper section below).

B. DERIVATION OF EFFLUENT LIMITATIONS

1. Effluent Flow

The draft permit contains a new 12 month rolling average effluent flow limit of 18.0 MGD. Sewage treatment plant discharge is encompassed within the definition of "pollutant" and is subject to regulation under the CWA. The CWA defines "pollutant" to mean, *inter alia*, "municipal . . . waste" and "sewage…discharged into water." 33 U.S.C. § 1362(6). The limitation on sewage effluent flow is within EPA's authority to condition a permit in order to carry out the objectives of the Act. *See* CWA §§ Sections 402(a)(2) and 301(b)(1)(C); 40 C.F.R. §§ 122.4(a) and (d); 122.43 and 122.44(d). Regulating the quantity of pollutants in the discharge through a restriction on the quantity of wastewater effluent is consistent with the overall structure and purposes of the CWA.

The draft permit does not include any changes from the current permit that reflect the increased capacity of the upgraded facility (20.5 mgd) requested by the City of Brockton and others, as EPA has determined that such an increase cannot be authorized at this time consistent with the Massachusetts Antidegradation regulations (314 CMR 4.04) and procedures. The basis for this determination is set forth below.

a. Background

As discussed above, the Brockton AWRF was designed to treat an average effluent flow of 18 MGD.[1] This design flow is reflected in the current permit in the calculation of mass load limits for $CBOD_5$, TSS and ammonia. The Brockton AWRF has not had a numeric flow limit in its current or previous permits; EPA notes that this is different from standard practice in Massachusetts NPDES permits, which generally contain an effluent flow limit based on a facility's design flow, implemented as a 12 month rolling average limit. While not containing a numeric flow limit, the current permit did contain restrictions on increased wastewater flow to the facility, with a condition stating that:

> Flows originating from the Towns of Abington and Whitman are limited each to an annual average of 1 MGD. The Co-permittees shall not accept flow from any new sewer connections in other communities although, EPA and MA DEP may allow such a tie-in through a permit modification, if an abutting Town with a completed Comprehensive

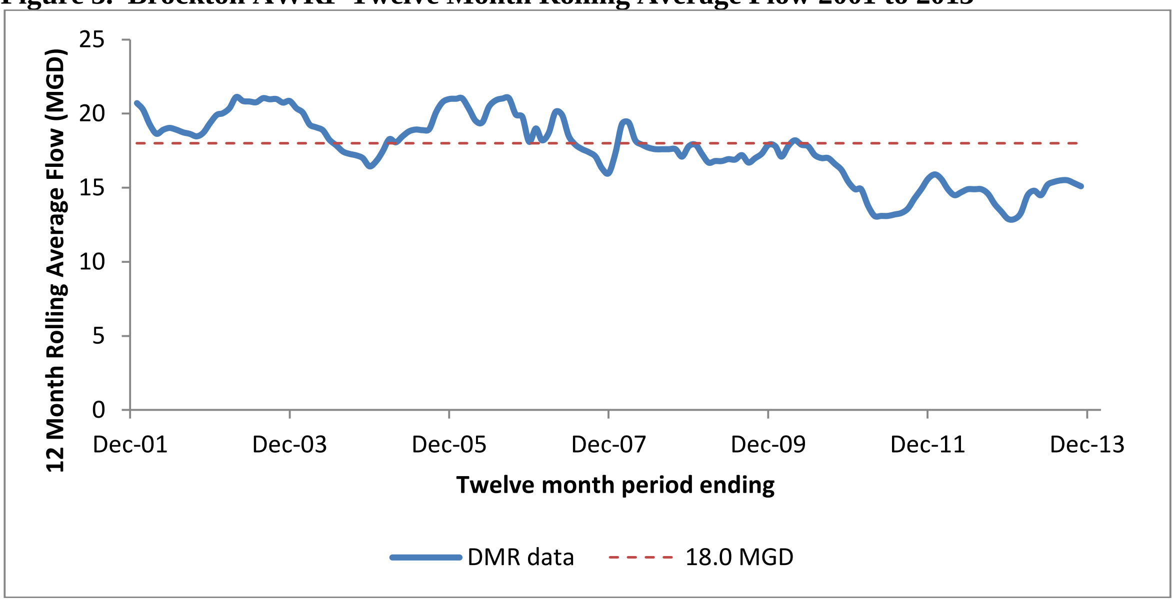
[1] This is the facility's design flow in its upgrade in the 1970s. See Response to Comments, MA0101010 (2005), City of Brockton comment #1.

> Wastewater Management Plan (CWMP) demonstrates that a tie-in to Abington or Whitman is an appropriate option.
>
> Increased flows from facilities currently connected directly to the Brockton sewer system shall be offset, to the extent feasible, in order to minimize any net increase in flow to the WWTP.

Final Permit MA0101010, Part I.A.1 n.3 (2005). Historically (until 2007) the Brockton AWRF has operated for lengthy periods above the 18.0 MGD design flow. See Figure 3.

The upgraded AWRF was designed with an increased capacity of 20.49 MGD and construction was completed in 2010. In the meantime the City was engaged in an intensive effort to reduce infiltration and inflow (I/I) in its system pursuant to a judicial consent order with EPA. This effort has dramatically reduced peak and average flows from the Brockton AWRF. Figure 3.

Figure 3. Brockton AWRF Twelve Month Rolling Average Flow 2001 to 2013



In conjunction with the reissuance of its NPDES permit the City of Brockton has requested that the new permit reflect the upgraded capacity of the facility of 20.49 MGD, most recently by letter of June 7, 2014. EPA has also received requests for increases to Brockton's permitted flows from other entities, including elected officials, and seeking consideration of the expansion of Brockton's role as a regional facility for wastewater disposal for surrounding communities. EPA has also received correspondence opposing such an increase. This Fact Sheet represents EPA's formal consideration of the proposed flow increase and EPA invites comment from all interested entities on its determination here.

The City's plan to upgrade with an increased capacity was raised in connection with the issuance of the current permit in 2005, and EPA's response at that time was as follows:

> We understand that the City's current plans are to construct upgraded facilities with a

> design flow of 20.48 MGD. However, the facilities plan which proposes this design flow increase has not yet been approved by MADEP, it has not been shown that Class B water quality standards can be attained at the increased flow, nor has the state conducted a review which demonstrates that this increase can be authorized under its antidegradation policy.
>
> An increase in design flow at the facility may be reflected in the City's permit after their facility's plan has been approved, it has been shown that the Class B water quality standards can be achieved at the increased flow and that the increased discharge can be authorized under the MADEP antidegradation policy. Limitations in the permit based upon a dilution factor [metals] would need to be adjusted to reflect the change in dilution at the low flow conditions.

Response to Comments, MA0101010 (2005), Response #1. As the state has approved the facility plan and the upgrade construction is complete, EPA proceeds to assess antidegradation and the meeting of water quality standards below.

In making this assessment, EPA acknowledges the extensive effort that has gone into evaluating wastewater treatment alternatives in this region, including the *Upper Taunton River Regional Wastewater Evaluation* (CDM Smith/Weston & Sampson, 2012) and the MEPA process for construction of the upgraded Brockton AWRF (EEA #13109). EPA also recognizes the needs expressed by a number of surrounding communities. Indeed in moving forward on permit issuance EPA intends to provide some relief to communities who now or in the future have agreements with the City of Brockton by removing the strict limitation on additional connections that is included in the current permit, so that some of the capacity that has opened up through removal of I/I, even within the original 18 mgd, can be allocated.

However, as indicated in the Response to Comments to the previous, jointly-issued EPA and MassDEP permit for this facility, an antidegradation review and assessment of the meeting of water quality standards under an increased flow is needed before the permit can reflect any increase in design flow from 18 to 20.5 mgd, and the regional studies and MEPA processes do not themselves satisfy these requirements. An increase in design flow is itself an increase in pollutants to the receiving water,[2] as well as having potential for increasing loading of individual pollutants, some of which (pharmaceuticals, endocrine disrupters, etc.) have not been monitored. Therefore any increase in flow requires antidegradation review to ensure that all increases are within the assimilative capacity of the river or otherwise authorized pursuant to the antidegradation regulations, both at the point of discharge and further downstream. In addition, EPA's regulations require that no permit be issued unless conditions can be imposed that ensure compliance with water quality standards. These requirements are addressed in turn below.

b. Antidegradation Review

In accordance with 40 CFR 131.12, the State Water Quality Standards at 314 CMR 4.04 include

[2] Effluent flows are treated sewage and are expressly included in the definition of "pollutant" under the Clean Water Act and EPA's regulations. 33 U.S.C. 1362(6) ("The term 'pollutant' means . . . sewage . . . discharged into water.").

an antidegradation provision that apply to all new or increased point source discharges to waters of the Commonwealth requiring a permit under 314 CMR 3.00. The Implementation Procedures ensures that existing instream water uses are protected and maintained, and water quality levels in high quality waters are protected and maintained. MassDEP published a policy document, titled *Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (Implementation Procedures)* on October 21, 2009 that explains how the antidegradation provisions of the State standards are implemented. The Implementation Procedures establish a technology-based review for all discharges, and four tiers of additional review dependent on the quality of the receiving water.

i. Background

As context for the antidegradation analysis, it should be noted that the receiving water, and the overall Taunton River watershed, are extremely effluent dominated even under the historic design flow conditions. Under 7Q10 conditions (the specified conditions for antidegradation analysis, *see Implementation Procedures* at 2), the natural baseflow in the Salisbury Plain River is only 2% of the 18.0 mgd historic design flow. Even under less severe conditions the plant effluent flows dwarf the natural flows in the Salisbury Plain River; a USGS Streamstats estimate of median August flows just upstream of the discharge is 3.35 cfs (2.2 mgd), only 12% of the 18 mgd design flow.

These effluent dominated conditions persist well downstream of the point of discharge. The Salisbury Plain River flows 2.3 miles into the Matfield River, then 6.7 miles to the confluence with the Town River to form the Taunton River. The natural 7Q10 flow in the lowermost Matfield River is calculated as 2.27 cfs (1.5 mgd), only 8% of Brockton's 18 mgd historic design flow. Even in the Taunton River, a designated Wild and Scenic River and the longest undammed river in the northeast, the majority of flow in low flow conditions is Brockton effluent. The Town River 7Q10 is about 2.7 cfs (1.7 mgd), so that the uppermost Taunton River is only 3.2 MGD at 7Q10 flows. Even as far downstream as the City of Taunton the river is more than 50% effluent under 7Q10 conditions (at that point including other effluent sources in addition to Brockton). See Taunton WWTP Fact Sheet, MA0100897.

The 2.5 mgd additional flow sought by the City of Brockton is by itself larger than the 7Q10 or median August flows at the point of discharge, and larger than the 7Q10 flows in either the Matfield or the Town Rivers at the point where they join to form the Taunton River. A 2.5 mgd discharge would itself constitute a "Major" NPDES discharge if it were a separate facility; indeed it would be the third largest POTW discharging to the freshwater Taunton River or its tributaries (behind Brockton and Mansfield (3.14 mgd) and larger than Middleborough (2.16 mgd) and Bridgewater (1.44 mgd)).

i. Technology-based review

As stated in the <u>Implementation Procedures, the </u>"minimum technology based treatment requirements for publicly owned treatment works (POTWs) consist of secondary treatment and applicable limitations and standards promulgated by EPA" and "[t]he technology based review for POTWs subject to the SRF process generally is satisfied upon completion of the Comprehensive Wastewater Management Plan or Project Evaluation Report, public participation and Department approval." Section II. While the City of Brockton has not completed a CWMP, in this case the treatment provided for the increased flow is far better than required to achieve secondary treatment requirements and construction proceeded through the SRF process, so the technology-based requirements of the Implementation Procedures have been satisfied.

ii. Tier Review

The primary focus of each Tier review is listed below:

Tier 1	review to protect existing uses in all waters
Tier 2	review to protect and maintain existing water quality in high quality waters
Tier 2 1/2	review to protect outstanding resource waters
Tier 3	review to protect special resource waters

As can be seen, each tier is associated with a specific receiving water designation. The Implementation Procedures require greater protection for higher value waters.

New or increased discharges to special resource waters (Tier 3) are essentially prohibited.

New or increased discharges to outstanding resource waters (Tier 2 ½) are allowed only where the discharge is determined, among other things, to be for the express purpose and intent of maintaining or enhancing the resource for its designated use.

New or increased discharges to high quality waters (Tier 2) are limited to increases that are insignificant, or are authorized pursuant to 314 CMR 4.04(5). These waters must be protected and maintained for their existing water quality. Authorization of a significant increase requires a demonstration that:

1. The discharge is necessary to accommodate important economic or social development in the area in which the waters are located[3];
2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and
4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

314 CMR 4.04(5)(a).

New or increased discharges to all other waters (Tier 1) may be allowed, providing that existing uses, and water quality to protect those uses, is maintained and protected.

[3] For POTWs, if the proposed discharge is subject to the Clean Water State Revolving Fund (SRF) process, is in accordance with a Comprehensive Wastewater Management Plan (CWMP) or Project Evaluation Report, has been subject to public participation, and is approved by the State, then it is presumed that the requirement of economic or social importance has been met.

The first step then, is to determine the receiving water(s) classification and condition in order to determine the applicable tier(s). As noted above, the receiving water, Salisbury Plain River, is classified as a Class B warm water surface water and is an effluent dominated stream (the Brockton AWRF makes up over 95% of the flow in the Salisbury Plain River under 7Q10 conditions).

The segment of the Salisbury Plain River to which the Brockton AWRF discharges (segment 62-06) is listed in the Massachusetts 303(d) list for impairments to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor, turbidity and debris/floatables/trash (denoted 'not a pollutant'; no TMDL required). The Salisbury Plain River joins Beaver Brook in East Bridgewater to form the Matfield River (segment 62-32), which is also listed in the 303(d) list (impairments due to aquatic macroinvertebrate bioassessments, excess algal growth, fecal coliform (TDML completed), dissolved oxygen, total phosphorus, taste and odor). The Matfield River joins with the Town River in Bridgewater to become the Taunton River.

Given the extensive and comprehensive impairments, in general the Salisbury Plain and Matfield Rivers would not be considered "high quality" waters, although there may be individual pollutants for which high quality status could be demonstrated in these segments on a case by case basis (antidegradation analysis is performed on a criteria by criteria basis). These segments would therefore be subject to Tier 1 review. The Taunton River segments downstream of the Matfield (confluence with the Town River) have been assessed as achieving aquatic life uses, are not listed on the Massachusetts 303(d) list, and are likely to be high quality for many pollutants (Tier 2 review). There are no Outstanding or Special Resource Waters downstream of the discharge, so Tiers 2½ and 3 do not apply.

To determine which criteria and pollutants are subject to Tier 1 review, EPA reviewed the available water quality data for the receiving water as well as the water quality based limits in the current permit, which are based on previous analyses indicating that such limits are necessary to meet water quality standards in the receiving water (no additional assimilative capacity is available). A listing of identified Tier 1 pollutants is shown in Table 3.

Table 3. Tier 1 Pollutants in Salisbury Plain River

Tier 1 Pollutant	Basis for Tier 1 Determination
BOD	Permit limit, Wasteload Allocation, 303(d) listed DO impairment
TSS	Permit limit, Wasteload Allocation
DO	Permit limit, 303(d) listed DO impairment
Bacteria	Permit limit, 303(d) listed impairment
Ammonia	Permit limit, Wasteload Allocation, 303(d) listed DO impairment
Phosphorus	Permit limit, 303(d) listed impairment
Copper	Permit limit

For these criteria the receiving water no longer has any assimilative capacity for an increase in pollutant loads. In order to protect existing uses with respect to these pollutants, no increase in pollutant loads to the receiving water is permitted. This means that for pollutants with existing numeric permit limits, the existing load limit is maintained even if an increase in flow is authorized. The City of Brockton's request for an increase in load limits to reflect the increase in facility capacity is therefore denied.

The Salisbury Plain and Matfield Rivers have also been determined to have impairments that are not specifically linked to an individual pollutant. Both waters are listed on the 303(d) list with impairments to "taste and odor" and to "aquatic macroinvertebrate bioassessments." Both of these impairments are in connection with narrative criteria within the Massachusetts narrative water quality standards. [taste and odor] 314 CMR 4.05(5)(b) provides:

> Bottom Pollutants or Alterations. All surface waters shall be free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms.

While these impairments are based on data prior to the facility upgrade, receiving water monitoring performed by the City's consultants as part of a Supplemental Environmental Project in 2010 indicated that impaired benthic macroinvertebrate conditions continue subsequent to the improvements in the facility (and are present both upstream and downstream of the facility).

> One of the most striking aspects of the biological samples from the Salisbury Plain River and Matfield River is the near absence of pollution intolerant macroinvertebrate taxa, especially the EPT taxa.
> • The caddisflies Cheumatopsyche sp. and Hydropsyche betteni were the only EPT taxa consistently found, yet these are among the most tolerant stream caddisflies and are often used as indicators of organic pollution rather than indicators of clean water.
> • No stoneflies and only two individual mayflies were detected, despite the presence of suitable habitat in four of the survey sites.
> Macroinvertebrate samples were comprised of a low diversity of habitat generalists that are tolerant of a range of conditions in warmwater streams.

CDM, *Brockton Receiving Water Assessment SEP* (2011). The impairment downstream of the facility appears to be directly related to the discharge; while impaired conditions exist both upstream and downstream of the facility, the nature of the macroinvertebrate population changes in a manner consistent with the nutrient-enriched discharge of the Brockton AWRF.[4]

The same study included a Habitat Assessment, Macrophyte Assessment and Fish Population Survey, concluding that "[t]he biological communities in the Salisbury Plain River and Matfield River are mostly comprised of habitat generalists"; that ""[o]nly seven fish species were detected; tessellated darters comprised 86 percent (184 of 214) of all fish captured" and that "[h]abitat conditions are suboptimal or poor throughout these rivers". *Id.* at 12.

[4] As summarized in the *Brockton Receiving Water Assessment SEP* at 12-13: "There seems to be a general trend from a highly polluted, fungal/bacterial-dominated river upstream of Brockton's AWRF to a more typical nutrient-rich, algal-dominated river downstream. It is difficult to quantify the effects of Brockton's AWRF on biological communities because of the highly degraded state of the Salisbury Plain River upstream of the facility. A suitable upstream control does not exist."

While EPA hopes to address these downstream conditions at least in part with the imposition of more stringent limits on Total Phosphorus in this Draft Permit (see Section VI.B.5 of this Fact Sheet), it remains unclear whether healthy macroinvertebrate conditions can be achieved with this high (let alone a higher) a proportion of effluent in the receiving water. Therefore EPA cannot conclude on current information that increasing the volume of flow to this system can be assimilated consistent with antidegradation requirements.

Tier 2

EPA must also consider whether the proposed increase is consistent with Tier 2 review, both for the immediate receiving water (for any parameters for which the stream is high quality) and downstream waters. The Taunton River downstream of the confluence of the Matfield and Town Rivers is listed as attaining the Aquatic Life use, with other uses not assessed. The Taunton River is the longest undammed river in Massachusetts. It is a designated Wild and Scenic River under 16 U.S.C. §§ 1271-1287, which was enacted to preserve outstanding rivers (although the Act does not prescribe specific regulatory implications under the Clean Water Act):

> It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.

Wild & Scenic Rivers Act (October 2, 1968).

As discussed above, the first question with respect to Tier 2 review is whether the increased discharge is "insignificant." As set forth in the Massachusetts Antidegradation Implementation Procedures:

> <u>Insignificant discharges</u> - Except where the Department determines that in order to adequately protect water quality a particular discharge of the type described below requires an antidegradation authorization under 314 CMR 4.04(5), the Department has determined that the following discharges are insignificant:
>
> a) <u>Temporary discharges</u> – [not applicable] . . .; and
> b) <u>New or increased loadings of a pollutant that use < 10% of the unused loading capacity of a receiving water</u> - a new or increased discharge of a pollutant that would use less than 10% of the available assimilative capacity of the receiving water for that pollutant.

In general monitoring data for the Taunton mainstem has indicated Tier 2 status for the commonly monitored parameters (phosphorus, ammonia, TSS, DO, copper) but there is a limited amount of recent data available to perform a current assessment of the assimilative capacity of the receiving water. However, as the City's request for an increase in load limits is not being granted, no increase in loads will occur for such pollutants.

EPA also notes that the Salisbury Plain and Matfield Rivers suffer from impaired benthic macroinvertebrate communities, and taste and odor impairments, that have not been linked to specific pollutants but appear to be related to the Brockton AWRF. The Taunton mainstem is currently high quality for these water quality standards, and it is difficult to assess the amount of assimilative capacity available given lack of clear evidence of the specific effluent components that are causing these impairments. However, in order to satisfy antidegradation requirements it must be demonstrated that the increased discharge of effluent uses less than 10% of the Taunton River's assimilative capacity, or this increase must be treated as a significant increase requiring a full authorization process.

A further concern is the range of emerging contaminants, including endocrine disrupters, pharmaceuticals, personal care products and other substances, known to be present in POTW effluent and receiving waters downstream of wastewater treatment facilities. See, e.g., EPA, *Occurrence of Contaminants of Emerging Concern in Wastewater from Nine Publicly Owned Treatment Works* (2009); USGS, *A Reconnaissance for Emerging Contaminants in the South Branch Potomac River, Cacapon River, and Williams River Basins, West Virginia, April-October*, USGS OFR 2006-1393 (2006). While there are no numeric water quality criteria for such pollutants to date, these pollutants are known to impact aquatic life[5] and are subject to state narrative water quality standards.[6] There is no data available for such contaminants for either the Brockton AWRF or the receiving water on which to base an analysis of assimilative capacity. In order for EPA to properly assess whether the proposed increase is "insignificant" EPA would require a detailed study of a range of emerging contaminants. *See, e.g.,* Kipp, K. *An Investigation into the Extent and Biological Impacts of Endocrine Disrupting Chemical (EDCs) in a Highly Effluent-Dominated River in New England: Preliminary Results* (2011) https://www.neiwpcc.org/ppcpconference/ppcp-docs/2011presentations/Session%204/4.2%20Kipp.pdf

Even in the absence of more comprehensive data, EPA notes that on a qualitative level it is difficult to characterize the proposed increase in discharge as "insignificant". As noted above under 7Q10 conditions flow in the uppermost reach of the Taunton River is only 3.2 mgd,

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[5] Iwanowicz, et al., "Reproductive Health of Bass in the Potomac, USA Drainage: Part 1. Exploring the Effects of Proximity to Wastewater Treatment Plant Discharge," 28 *Env. Toxicology and Chemistry* 1072-1083 (2009); Kidd, et al., "Collapse of a fish population after exposure to synthetic estrogen," 104 *Proc. Nat'l Acad. Of Sciences* 8897-8901 (2007); Gagne, et al., "Effects of pharmaceutical products and municipal wastewaters on temperature-dependent mitochondrial electron transport activity in *Elliptio complanata* mussels," 143 *Comp. Biochem. And Physiol., Part C*, 388-393 (2006); Pait, A.S. and J.O. Nelson, *Endocrine Disruption in Fish: An Assessment of Recent Research and Results*. NOAA Tech Memo. NOS NCCOS CCMA 149 (2002).

[6] The MA SWQS require that "Discharges shall be limited or prohibited to protect existing uses and not interfere with the attainment of designated uses in downstream and adjacent segments. The Department will provide a reasonable margin of safety to account for any lack of knowledge concerning the relationship between the pollutants being discharged and their impact on water quality." 314 CMR 403(1)(a). Designated uses for these water are "Class B. These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value." 314 C.M.R. 403(3)(b). The MA SWQS also state that "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." 314 CMR 405(5)(e).

dwarfed by the current 18 mgd design flow of the Brockton AWRF and only slightly more than the proposed increase; if the proposed increase were a new facility it would be the third largest POTW discharge to the freshwater portion of the Taunton River. In this context EPA would encourage MassDEP to use its authority under the Antidegradation Implementation Procedures to require an authorization under 314 CMR 4.04(5) even if specific pollutant loads are not shown to use more than 10% of assimilative capacity.

Authorization under 314 CMR 4.04(5) requires a demonstration that:

> 1. The discharge is necessary to accommodate important economic or social development in the area in which the waters are located;
> 2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
> 3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and
> 4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

314 CMR 4.04(5)(a). Normally the requirement of "important economic or social development" is met through approval of a CWMP; as no CWMP has been completed or approved for the City of Brockton or its copermittees Abington or Whitman, this requirement would have to be met prior to authorization. Further, the City would have to show that there is no feasible alternative to the flow increase, not only for its own wastewater disposal but for any other community seeking to connect to the Brockton AWRF. No such showing has been made here.

EPA acknowledges that, as pointed out by the City, the upgraded capacity was subject to a certificate from the Massachusetts Executive Office of Environmental Affairs pursuant to the MEPA process in 2003. However, the MEPA process itself does not establish consistency with antidegradation requirements pursuant to the Massachusetts Antidegradation Implementation Procedures. Indeed, even if the full CWMP/SRF approval process were followed (not the case here as neither Brockton nor its current copermittees has a CWMP), that process is relevant to only one of the four requirements for antidegradation authorization, that of economic and social importance.[7] In addition the EOEA certificate was issued based on design documents indicating that the facility's existing flow had averaged 19.79 mgd from 1998 to 2002, *Design Memorandum W1-A* (July 2003), so that the upgraded facility was sized essentially to treat existing flows; a revised assessment of economic and social importance would be justified in light of the substantial reduction in flow achieved through the I/I mitigation work performed under the City's consent decree which has reduced current flows well below the 18.0 mgd permitted flow.

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[7] The CWMP process does not, and is not designed to, establish the other three factors for authorization. For example, an antidegradation authorization for a significant lowering of water quality requires that "no less environmentally damaging alternative . . . is reasonably available and feasible"; this is a far different standard from the CWMP direction to select the alternative with "the greatest environmental and cost benefit." See MassDEP, *Guide to Comprehensive Wastewater Management Planning* (1996) at 26. http://www.mass.gov/eea/docs/dep/water/laws/i-thru-z/wwtrfpg.pdf.

c. Water Quality Standards

As discussed in section V of this Fact Sheet, NPDES permits are required to include limitations that ensure the meeting of water quality standards in the receiving water. Specifically, 40 C.F.R. 122.4 provides that "No permit may be issued . . . [w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States."

In general these requirement are implemented through numeric permit limits calculated using a dilution factor for the receiving water under 7Q10 flow conditions. This approach is generally considered to address the critical conditions of maximum pollutant impact, where dilution of the discharge is at a minimum. Since at most times receiving water flow is well above the 7Q10, use of the 7Q10 as an assumed flow ensures that exceedances of the water quality criteria will be limited in duration and frequency as assumed in the calculation of the criteria (for example, chronic criteria reflect concentrations to be exceeded less than once every three years for a four day period), so that the limit is protective.

Facilities such as the Brockton AWRF, which have essentially no dilution by the receiving water for extended periods of time, represent a challenge in the context of setting water quality based limits. In essence, with a receiving water flow that is about 2% of the facility's design flow at 7Q10, permit limits must be set that ensure that the discharge itself meets water quality standards. However, where the varying flow of the receiving water is not sufficient to ensure that critical pollutant concentrations are limited in duration and frequency, it is not always clear that average monthly and maximum daily permit limits will be sufficiently protective to meet water quality standards. For example, as discussed below the draft permit contains a permit limit of 100 ug/l total phosphorus to address eutrophication in the Salisbury Plain and Matfield Rivers, based on the Gold Book target that streams should not exceed 100 ug/l TP. For most facilities a permit limit based on that target will ensure that concentrations are well below 100 ug/l for most of the year, which should be sufficient to protect against eutrophication impacts. However for Brockton a 100 ug/l permit limit may result in stream concentrations of approximately the target concentration for long periods of the summer; it is unclear whether eutrophication impairments will be prevented under those circumstances of consistent and relatively high TP concentrations.

Therefore, EPA's approach to permitting of the Brockton AWRF discharge includes reassessment of instream conditions as treatment has improved to determine the effectiveness of the permit limits and conditions. For example, in Brockton's previous permit a TP limit of 0.2 mg/l was set; receiving water assessments performed by the City of Brockton's consultants revealed continued impairments consistent with nutrient overenrichment downstream of the AWRF. Under the new permit Brockton will need to improve its nutrient reduction to achieve at most 100 ug/l TP; EPA expects to review receiving water conditions downstream of the AWRF to determine if that limit is sufficient to protect against eutrophication impacts from the discharge or if a more stringent limit is necessary; EPA will also consider any calibrated and verified water quality modeling of the system that may be completed for this system.[8] This assessment will not

[8] EPA notes that USGS and MassDEP have performed some preliminary work on modelling loads in the upper Taunton River Basin, including calibrating a precipitation-runoff HSPF model, although it is not clear whether a calibrated and verified water quality model will be forthcoming as the project continues. See USGS, *Nutrient and Sediment Concentrations, Yields, and Loads in Impaired Streams and Rivers in the Taunton River Basin, Massachusetts, 1997–2008*, SIR 2012-5277 (2012).

be limited to nutrients; under such extreme effluent-dominated conditions there is potential for other pollutants, or the combined effects of multiple pollutants, to impact receiving water habitat and aquatic life that may not be captured by individual pollutant criteria.

In this context, when considering a flow increase EPA must also carefully consider the ability to issue a permit that ensures the meeting of water quality standards at an increased effluent flow up to 20.49 mgd. EPA notes that this is a significant increase in total flow; the increase alone is more than six times the 7Q10 flow in the Salisbury Plain River, and would itself be a major discharge and the third largest discharge on the Taunton River. Increasing the design flow will further increase the duration of conditions under which the Brockton AWRF represents the vast majority of receiving water flow, and increase the extent of the entire Taunton River system under which the AWRF is the majority of flow. Thus, until the evidence indicates that water quality standards can be met in the Salisbury Plain River under existing flows (which to date has not been the case), EPA will not authorize an even larger discharge to this receiving water.

d. Conclusion

For the reasons given above, the City of Brockton's request for an increase in permitted flow and load limits to reflect a 20.5 mgd flow is denied. A twelve month rolling average flow limit of 18.0 mgd is included in the Draft Permit.

EPA understands that the City wishes to pursue authorization of a flow increase. EPA therefore provides the following as guidance to the process by which a flow increase can be evaluated for purposes of further review and potential authorization.

1. Process to demonstrate meeting of water quality standards
    a. Institute plant improvements to achieve new permit limits; plant improvements should be in place at least one year and preferably two to allow assimilation of receiving water to new conditions; and
    b. Perform receiving stream evaluation similar to that performed in 2010 Receiving Water Assessment, but extending to sites in the Taunton River mainstem; and either
    c. If results confirm the discharge is no longer contributing to water quality impairments, can request increase if consistent with antidegradation requirements (below); or
    d. If results indicate discharge is contributing to water quality impairments, can
        i. Propose plan with permit limits that will ensure discharge will not contribute to impairments at current and increased effluent flow; or
        ii. Initiate water quality standards proceeding for variance or downgrade of receiving water classification, including Use Attainability Analysis and public process

2. Process to demonstrate meeting of Antidegradation requirements
    a. Perform monitoring and evaluation of emerging contaminants, particularly endocrine disrupters, in effluent and in receiving water to

determine concentration, loads and assimilative capacity (EPA is available to assist in defining scope of monitoring and evaluation); and

b. Evaluate benthic macroinvertebrate and taste/odor conditions in impaired reaches and in Taunton River mainstem to determine extent of impairment and contributing pollutants and evaluate assimilative capacity in unimpaired reaches (may be best to wait until after plant improvements as in 1.b. above); and
c. Determine whether flow increase will result in loss of more than 10% assimilative capacity in any downstream reach. If it can be demonstrated that it does not, proceed to request flow increase; or
d. If increase cannot be demonstrated to be insignificant, proceed to antidegradation authorization proceeding under 314 CMR 4.04(5). Upon authorization pursuant to 314 CMR 4.04(5) (including "No less environmentally damaging alternative . . . is reasonably available or feasible" showing), can proceed to request flow increase.

EPA presumes that the City, MassDEP, and perhaps other regional entities will coordinate the work required to meet these requirements. EPA is available to provide technical assistance as necessary during this process. EPA notes that protection and improvement of baseflow conditions in the watershed is an important component of the assimilative capacity of the receiving water and downstream segments. EPA therefore encourages exploration of groundwater recharge opportunities in this process.

Finally, as the City has made substantial progress in addressing I/I issues and is operating below the 18.0 mgd flow limit, the specific limitation on additional flow from Abington, Whitman or other communities has been deleted from the permit. While the City of Brockton has discretion to allocate its available capacity as it deems appropriate, EPA encourages the City to ensure that it reserves capacity for its future needs, and encourages surrounding communities to utilize local recharge solutions to wastewater management needs where feasible, consistent with the *Massachusetts Water Policy* (2004) (http://www.mass.gov/eea/waste-mgnt-recycling/water-resources/preserving-water-resources/massachusetts-water-policy-2004.html)

2. Dilution

Water quality based limitations are established with the use of a calculated available dilution. Title 314 CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10 year recurrence interval. Additionally, the plant design flow is used to calculate available effluent dilution; permit limits are expressed in terms of mass as well as concentration to ensure that the assumptions of the dilution calculation are met.

The plant design flow used to calculate the dilution factor for the current permit was 18.0 mgd. The City in its application stated that the current design flow rate of the (upgraded) facility was 20.49 mgd, and requested by letter that the increased flow capacity be used in calculation of permit limits. Because such an increase would not be consistent with MassDEP's antidegradation regulations (see discussion above), EPA has used 18.0 MGD in these calculations.

There is no stream gaging information available on the Salisbury Plain River. The prior permit calculated a 7Q10 based on the Wading River, stating that the Wading River is a near-by river with similar hydrologic characteristics. This produced an in-stream 7Q10 flow of 0.39 MGD that was used to determine the dilution factor. EPA has reviewed the available data for 7Q10 flows in this watershed and determined that this continues to be a reasonable value for 7Q10 flows.[9]

Qs = In stream 7 day 10 year low flow (7Q10) = 0.39 MGD
Dilution Factor = (Qs + Qd) / Qd = (0.39 + 18) / 18 = 1.02

3. Conventional Pollutants

<u>Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)</u> – Limits for $CBOD_5$ and TSS are the same as in the current permit. These are water quality based limits that are more stringent than the secondary treatment requirements set forth at 40 CFR Part § 137.102(a)(4).

For May through October, the limits are an average monthly concentration of 5 mg/l, a weekly average concentration of 8 mg/l, and a maximum daily concentration of 15 mg/l. For November through April the limits are 15 mg/l average monthly, 25 mg/l average weekly, and 30 mg/l daily maximum. These were established by the MassDEP as a wasteload allocation. There were no violations of the $CBOD_5$ or TSS limits in the period January 2010 through December 2013. The average summer CBOD and TSS were 1.3 mg/l and 1.2 mg/l respectively. The monitoring frequency remains the same at 1/day.

The permit utilizes $CBOD_5$ as the measure of oxygen demand due to high nitrogenous oxygen demand in the effluent, as allowed under 40 CFR § 133.102(a)(4). The $CBOD_5$ test reduces the interference from nitrogenous compounds that would otherwise make accurate assessment of the organic (carbonaceous) oxygen demand impossible.

The permit also contains accompanying mass limitations that are based on the facility's approved design flow of 18.0 mgd. Average monthly and average weekly $CBOD_5$ and TSS mass limits (lbs per day) are consistent with 40 CFR §122.45(f).

$CBOD_5$ and TSS Mass Loading Calculations:

Calculations of maximum allowable loads for average monthly BOD_5 and TSS are based on the following equation:

L = C x 18.0 x 8.34

L = Maximum allowable load in lbs/day.
C = Maximum allowable effluent concentration for reporting period in mg/l.
Reporting periods are average monthly and weekly and daily maximum.

[9] For comparison, an estimate of 7Q10 flow from the USGS StreamStats model, based on regression equations, yields a 7Q10 flow at the Brockton AWRF of 0.47 cfs or 0.3 mgd. This would result in a dilution factor of 1.02, the same as used in the current permit.

18.0 = Approved design flow of facility
8.34 = Factor to convert effluent concentration in mg/l and design flow in mgd to lbs/day.

(Concentration limit) [30] x 8.34 (Constant) x 18.0 (design flow) = 4,500 lb/day
(Concentration limit) [25] x 8.34 (Constant) x 18.0 (design flow) = 3,750 lb/day
(Concentration limit) [15] x 8.34 (Constant) x 18.0 (design flow) = 2,250 lb/day
(Concentration limit) [8] x 8.34 (Constant) x 18.0 (design flow) = 1,200 lb/day
(Concentration limit) [5] x 8.34 (Constant) x 18.0 (design flow) = 750 lb/day

Eighty-Five Percent (85%) BOD_5 and TSS Removal - the provisions of 40 CFR §133.102(a)(3) and (4), require that the 30 day average percent removal for $CBOD_5$ and TSS be not less than 85%. There were no violations of the $CBOD_5$ or TSS percent removal limits in the period January 2010 through December 2013. The average summer CBOD and TSS percent removal were 99% for both parameters.

pH - The draft permit includes pH limitations of a minimum of 6.5 standard units (s.u.) and maximum of 8.3 s.u. These pH limits are required as a condition of state certification and are protective of pH standards set forth at 314 CMR 4.05(4)(b)(3) for Class B waters, requiring that pH "[s]hall be in the range of 6.5 through 8.3 standard units and not more than 0.5 units outside of the natural background range." There were no violations of the pH limits in the period January 2010 through December 2013. The range of pH measured was 6.5 to 7.5 s.u., which is within the range of upstream Salisbury Plain River pH values (6.5 to 7.6 s.u.) as reported in the 2001 Taunton River Water Quality Assessment Report. The monitoring frequency remains the same at 1/day.

Bacteria
Limitations for bacteria in the existing permit are based upon state water quality standards for Massachusetts. There were no violations of the fecal coliform limit in the period January 2010 through December 2013.

The limits are modified in the Draft Permit to reflect the *E. coli* criteria in the revisions to the MA SWQS, 314 CMR § 4.05(3)(b), approved by EPA in 2007. The monthly average limitation in the draft permit is 126 colony forming units (cfu) per 100 ml, and shall be expressed as a monthly geometric mean. The daily maximum limitation in the draft permit is 409 cfu/100 ml, which represents the 90th percentile of a lognormal distribution with a geometric mean equal to 126 cfu/100 ml. EPA, *1986 Ambient Water Quality for Bacteria.* These limitations are a State certification requirement and are consistent with EPA guidance recommending that no dilution be considered in establishing permit limits for discharges to rivers designated for primary contact recreation. *EPA Memorandum re: Initial Zones of Dilution for Bacteria in Rivers and Streams Designated for Primary Contact Recreation*, November 12, 2008. The monitoring frequency is maintained at five times per week.

4. Dissolved Oxygen (DO) and Total Residual Chlorine

Dissolved Oxygen - The instantaneous minimum effluent DO limit of 6.0 mg/l or greater is carried forward from the current permit. The limit ensures that DO levels depleted during wastewater treatment process are restored prior to discharge to the Salisbury Plain River. The limit is established to protect the DO minimum Water Quality Criteria of 5.0 mg/l for waters designated by the State as Class SB. There were no violations of the DO limit in the period January 2011 to December 2013.

Total Residual Chlorine (TRC) – The Brockton AWRF uses ultraviolet (UV) disinfection. TRC limit are included in the permit in the event that chlorine compounds are used in the treatment process. No monitoring is required in periods when no chlorine compounds are used, and no monitoring was reported in the January 2011 to December 2013 period.

For any period in which chlorine compounds are used, permit limits are in effect based on the instream chlorine criteria defined in *National Recommended Water Quality Criteria: 2002*, EPA 822R-02-047 (November 2002), as adopted by the MassDEP into the state water quality standards at 314 CMR 4.05(5)(e). The criteria establish that the total residual chlorine in the receiving water should not exceed 11 ug/l (chronic) and 19 ug/l (acute). The following is a water quality based calculation of chlorine limits:

Acute Chlorine Fresh Water Criteria = 19 ug/l

Chronic Chlorine Fresh Water Criteria = 11 ug/l

(acute criteria * dilution factor) = Acute (Maximum Daily)
19 ug/l x 1.02 = 19.4 ug/l = **19 ug/l Maximum Daily**.

(chronic criteria * dilution factor) = Chronic (Average Monthly)
11 ug/l x 1.02 = 11.2 ug/l = **11 ug/l mg/l Average Monthly**

5. Phosphorus

The existing total phosphorus permit limit of 0.2 mg/l average monthly is reduced in the draft permit to 100 ug/l in order to meet the Gold Book target of 100 ug/l to prevent eutrophication in the receiving water. The facility averaged 0.16 mg/l total phosphorus in the January 2011 to December 2013 period.

Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody (EPA, 2001). The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In freshwater systems such as the Salisbury Plain River, phosphorus is the primary nutrient of concern.

The MA SWQS at 314 CMR 4.00 do not contain numerical criteria for total phosphorus. They include a narrative criterion for nutrients at 314 CMR 4.05(5)(c), which provides that “all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses.” They also include a requirement that “[a]ny existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs" Id. MassDEP has interpreted the "highest and best practicable treatment" (HBPT) requirement in its standards as requiring an effluent limit of 0.2 mg/l (200 ug/l) for phosphorus.

The City's current permit limit of 0.2 mg/l is based on HBPT. In determining whether the 0.2 mg/l limit is sufficient to ensure that water quality standards are met, EPA has assessed information concerning downstream conditions after the facility achieved the permit limit, and predicted instream concentrations as compared to threshold levels identified in the scientific literature for eutrophication impacts.

First, downstream assessments conducted by the City's consultants as part of a Supplemental Environmental Project (SEP) indicate that impaired benthic macroinvertebrate conditions continue subsequent to the improvements in the facility to achieve the 0.2 mg/l limit. As set forth in the SEP Report:

> **Benthic Macroinvertebrates**
> One of the most striking aspects of the biological samples from the Salisbury Plain River and Matfield River is the near absence of pollution intolerant macroinvertebrate taxa, especially the EPT taxa.
> • The caddisflies Cheumatopsyche sp. and Hydropsyche betteni were the only EPT taxa consistently found, yet these are among the most tolerant stream caddisflies and are often used as indicators of organic pollution rather than indicators of clean water.
> • No stoneflies and only two individual mayflies were detected, despite the presence of suitable habitat in four of the survey sites.
> Macroinvertebrate samples were comprised of a low diversity of habitat generalists that are tolerant of a range of conditions in warmwater streams.

CDM, *Brockton Receiving Water Assessment SEP* (2011). The impairment is thought to be related to nutrient discharges from the AWRF; conditions were described in the report as a "typical nutrient-rich, algal-dominated river downstream". Thus the available evidence from downstream monitoring indicates continued nutrient-related impairment with a 0.2 mg/l permit limit.

Second, EPA considers whether the predicted instream concentration at the permit limit is such that water quality standards will be met. In the absence of a numeric criterion for phosphorus, EPA looks to nationally recommended criteria and other technical guidance documents. *See* 40 CFR 122.44(d)(1)(vi)(B). EPA has produced several guidance documents which contain recommended total phosphorus thresholds for receiving waters. The *1986 Quality Criteria for Water* ("Gold Book") recommends in-stream phosphorus concentrations of no greater than 50 ug/l in any stream entering a lake or reservoir, 100 ug/l for any stream not discharging directly to lakes or impoundments, and 25 ug/l within a lake or reservoir. EPA has also released "Ecoregional Nutrient Criteria," established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. *Ambient Water Quality*

Criteria Recommendations: Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams, December 2000 (EPA- 822-B-00-022). The published criteria represent conditions in waters in that ecoregion that are minimally impacted by human activities, and thus representative of water without cultural eutrophication. The Brockton AWRF is within Ecoregion XIV, Eastern Coastal Plains. The recommended total phosphorus criterion for this ecoregion is 24 ug/l.

EPA has decided to rely on the Gold Book threshold of 100 ug/l rather than the more stringent ecoregion criteria of 24 ug/l, given that it was developed from an effects-based approach, versus the ecoregion criteria that were developed on the basis of reference conditions**.** The effects-based approach is taken because it is often more directly associated with an impairment to a designated use (i.e. fishing, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e., water quality impairments) are likely to occur. It applies empirical observations of a causal variable (i.e., phosphorus) and a response variable (i.e., chlorophyll *a*) associated with designated use impairments. In contrast, the ecoregion reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregion class. They are a quantitative set of river characteristics (physical, chemical and biological) that represent minimally impacted conditions.

The effects-based Gold Book threshold is a general target applicable in free-flowing streams. As the Gold Book notes, there are natural conditions of a water body that can result in either increased or reduced eutrophication response to phosphorus inputs; in some waters more stringent phosphorus reductions may be needed, while in some others a higher total phosphorus threshold could be assimilated without inducing a eutrophic response. In this case EPA is not aware of any evidence that the Salisbury Plain River is unusually susceptible to eutrophication impacts, so that the 100 ug/l threshold appears sufficient in this receiving water. With respect to factors that can reduce susceptibility, the Gold Book identifies morphometric features (steep banks, great depths and substantial flows), limitation by nutrients other than phosphorus, reduced light penetration where waters are highly laden with natural silts or color, or other naturally occurring phenomena that limit plant growth.[10] EPA is not aware of evidence that any of these factors are reducing eutrophic response in the Salisbury Plain River downstream of the discharge.

Therefore EPA has evaluated the projected instream concentration under current permit limits, and calculated a revised total phosphorus limit based on meeting the Gold Book target of 100 ug/l for preventing eutrophication, applied under 7Q10 conditions. In performing this calculation EPA assumes an upstream receiving water concentration of 48 ug/l, as reported from the upstream site in the *Brockton Receiving Water Assessment SEP*. The mass balance calculation is as follows:

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[10] The Gold Book also includes waters where "technological or cost-effective limitations may help control induced pollutants"; "waters managed primarily for waterfowl or other wildlife" and waters where "phosphorus control cannot be sufficiently effective under present technology to make phosphorus the limiting nutrient". As these factors do not address water body response but instead alternative technological solutions or changes in management goals, EPA does not consider them as altering the threshold necessary to meet the narrative water quality standard.

$(C_d * Q_d + C_s * Q_s) = C_r * Q_r$; where

C_d = Effluent concentration
Q_d = Design flow of facility = 18 mgd
C_s = Median concentration in the Salisbury Plain River upstream of discharge = 48 ug/l
Q_s = 7Q10 streamflow in the Salisbury Plain River upstream of discharge = 0.39 mgd
C_r = Receiving water concentration downstream
Q_r = Flow in receiving water downstream = $Q_s + Q_d$

At the current permit limit of 0.2 mg/l (200 ug/l), the projected receiving water concentration would be:

$$C_r = \frac{(C_d * Q_d + C_s * Q_s)}{} = \frac{[(18*200\ \text{ug/l} + 0.39\ \text{mgd} * 48\ \text{ug/l}]}{(18.39\ \text{mgd})} = 197\ \text{ug/l}$$

This is well over the Gold Book target and indicates that current discharges have the reasonable potential to cause exceedances of water quality standards. A revised permit limit based on meeting the Gold Book standard is calculated as follows:

$$\text{Permit limit } (C_d) = \frac{(C_r * Q_r - C_s * Q_s)}{(Q_d)}$$

$$\text{Limit} = \frac{[(18 + 0.39\ \text{mgd})*100\ \text{ug/l} - 0.39\ \text{mgd} * 48\ \text{ug/l}]}{18\ \text{mgd}} = 101\ \text{ug/l}$$

The draft permit also includes a load limit of 15.2 lb/day, calculated using the effluent concentration limit and the facility design flow.

The draft permit provides a compliance schedule for meeting the new total phosphorus limit at the earliest practicable time, pursuant to 314 CMR 4.03(1)(b) and 40 CFR 122.47(a)(1).

6. Total Nitrogen

The draft permit includes a monthly average total nitrogen limit of 450 lb/day total nitrogen, in effect for the months of May through October, in order to address cultural eutrophication in the Taunton River Estuary and Mount Hope Bay. In addition to this May to October numeric limit, the permit requires the permittee to optimize the treatment facility operations for the removal of total nitrogen during the months of November through April using all available treatment equipment at the facility. The basis for this determination is set forth below.

a. Ecological Setting: the Taunton River Estuary, Mount Hope Bay, Narragansett Bay and Estuarine Systems Generally

The saltwater portions of the Taunton River (the "Taunton River Estuary") and Mount Hope Bay are part of the greater Narragansett Bay Estuary system, which covers approximately 147 square miles within Massachusetts and Rhode Island. The Narragansett Bay Estuary is one of only 28 "estuaries of national significance" under the National Estuary Program (NEP), which was established in 1987 by amendments to the CWA to identify, restore and protect estuaries along the coasts of the United States.

Mt. Hope Bay (the Bay) is situated in the northeast corner of Narragansett Bay, lying within both Rhode Island to the south and west and Massachusetts to the north and east. The Bay connects to the East Passage of Narragansett Bay proper to the southwest, via a deep, narrow channel where the Mt. Hope Bridge crosses over from Aquidneck Island to Bristol Point, and to Rhode Island Sound to the South via the Sakonnet River (actually an embayment) between Tiverton, RI and Aquidneck Island. The Bay covers an area of 13.6 square miles, and has a volume of 53.3 billion gallons at mean low water (MLW). http://www.smast.umassd.edu/MHBNL/report2003.php. The Bay has a tidal range averaging approximately 4.5 feet.

The Taunton River is the largest freshwater source to Mount Hope Bay. It discharges into the Bay from the north at Fall River. The Taunton River Estuary consists of the saltwater portions of the Taunton River, extending from the Braga Bridge at the confluence with Mount Hope Bay upstream to the Route 24 bridge (Taunton/Raynham), approximately four miles upstream of the Taunton WWTP discharge. (MassDEP, 2001). It is the longest river unobstructed by dams in New England, with tidal influence extending upriver approximately 20 miles. (Horsley Witten, 2007). The Salisbury Plain River, to which the Brockton AWRF discharges, flows into the Matfield River which combines with the Town River in Bridgewater to form the Taunton River.

Estuaries are extremely significant aquatic resources. An estuary is a partially enclosed coastal body of water located between freshwater ecosystems (lakes, rivers, and streams; freshwater and coastal wetlands; and groundwater systems) and coastal shelf systems where freshwater from the land measurably dilutes saltwater from the ocean. This mixture of water types creates a unique transitional environment that is critical for the survival of many species of fish, birds, and other wildlife. Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land (EPA, 2001).

Maintaining water quality within an estuary is important for many reasons. Estuaries provide a variety of habitats such as shallow open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, tidal pools, and seagrass beds. Tens of thousands of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many species of fish and shellfish rely on the sheltered waters of estuaries as protected places to spawn.

Moreover, estuaries also provide a number of recreational values such as swimming, boating, fishing, and bird watching. In addition, estuaries have an important commercial value since they serve as nursery grounds for two-thirds of the nation's commercial fish and shellfish, and support tourism drawing on the natural resources that estuaries supply. (EPA, 1998). Consequently, EPA believes sound environmental policy reasons favor a pollution control approach that is both protective and undertaken expeditiously to prevent degradation of these critical natural resources.

Because estuaries are the intermediary between oceans and land, both of these geographic features influence their physical, chemical, and biological properties. In the course of flowing downstream through a watershed to an estuary, tributaries pick up materials that wash off the land or are discharged directly into the water by land-based activities. Eventually, the materials that accumulate in the tributaries are delivered to estuaries. The types of materials that eventually enter an estuary largely depend on how the land is used. Undisturbed land, for example, will discharge considerably fewer pollutants than an urban center or areas with large amounts of impervious cover. Accordingly, an estuary's overall health can be heavily impacted by surrounding land uses.

Unlike free-flowing rivers, which tend to flush out sediments and pollutants relatively quickly, an estuary will often have a lengthy retention period as up-estuary saltwater movement interacts with down-estuary freshwater flow (EPA, 2001). Estuaries are particle-rich relative to coastal systems and have physical mechanisms that tend to retain particles. These suspended particles mediate a number of activities (e.g., absorbing and scattering light, or absorbing hydroscopic materials such as phosphate and toxic contaminants). New particles enter with river flow and may be resuspended from the bottom by tidal currents and wind-wave activity. Many estuaries are naturally nutrient-rich because of inputs from the land surface and geochemical and biological processes that act as "filters" to retain nutrients within estuaries (EPA, 2001). Consequently, waterborne pollutants, along with contaminated sediment, may remain in the estuary for a long time, magnifying their potential to adversely affect the estuary's plants and animals.

b. Effects of Nutrients on Estuarine Water Quality

The basic cause of nutrient problems in estuaries and nearshore coastal waters is the enrichment of freshwater with nitrogen (N) and phosphorus (P) (EPA, 2001). EPA defines nutrient overenrichment as the anthropogenic addition of nutrients, in addition to any natural processes, causing adverse effects or impairments to beneficial uses of a waterbody. (EPA, 2001).

Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody (EPA, 2001). Increased nutrient inputs promote a progression of symptoms beginning with excessive growth of phytoplankton and macroalgae to the point where grazers cannot control growth (NOAA, 2007). Phytoplankton is microscopic algae growing in the water column and is measured by chlorophyll-a. Macroalgae are large algae, commonly referred to as "seaweed." The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as loss of submerged aquatic vegetation, nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In U.S. coastal waters, nutrient overenrichment is a common thread that ties together a diverse suite of coastal problems such as red tides, fish kills, some marine mammal deaths, outbreaks of shellfish poisonings, loss of seagrass and bottom shellfish habitats, coral reef destruction, and hypoxia and anoxia now experienced as the Gulf of Mexico's "dead zone." (EPA, 2001). Figure 4 shows the progression of nutrient impacts on a waterbody.

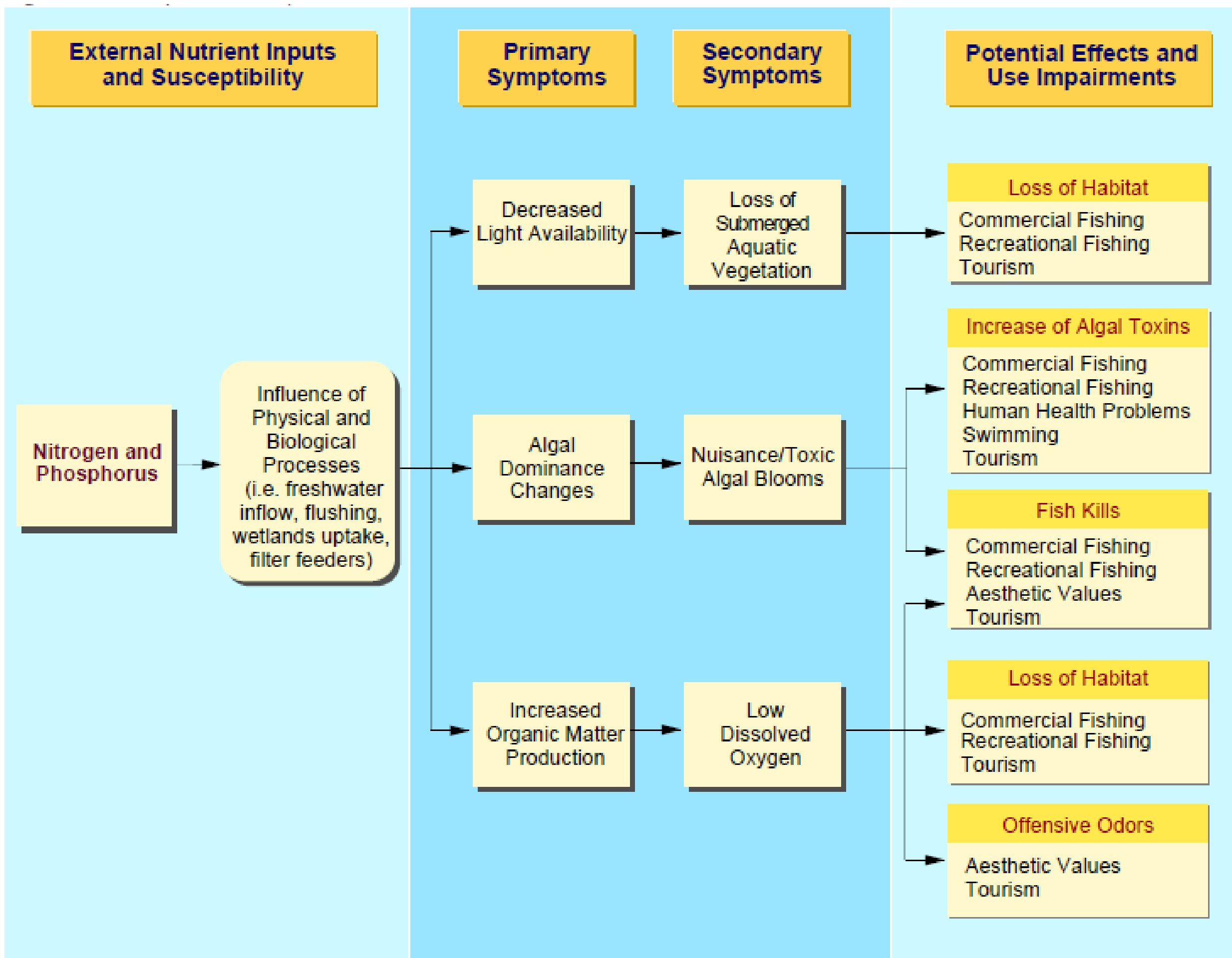

Figure 4. Nutrient enrichment model. Source: Bricker, 1999 as cited in EPA, 2001.

Estuarine nutrient dynamics are complex and are influenced by flushing time, freshwater inflow and stratification, among other factors. The deleterious physical, chemical, and biological responses in surface water resulting from excessive plant growth impair designated uses in both receiving and downstream waterbodies. Excessive plant growth can result in a loss of diversity and other changes in the aquatic plant, invertebrate, and fish community structure and habitat.

Nutrient-driven impacts on aquatic life and habitat are felt throughout the eutrophic cycle of plant growth and decomposition. Nutrient-laden plant detritus can settle to the bottom of a water body. In addition to physically altering the benthic environment and aquatic habitat, organic materials (*i.e.*, nutrients) in the sediments can become available for future uptake by aquatic plant growth, further perpetuating and potentially intensifying the eutrophic cycle.

Excessive aquatic plant growth, in addition, degrades aesthetic and recreational uses. Unsightly algal growth is unappealing to swimmers and other stream users and reduces water clarity. Decomposing plant matter also produces unpleasant sights and strong odors. Heavy growths of algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Algae and macrophytes can interfere with angling by fouling fishing lures and equipment. Boat propellers and oars may also get tangled by aquatic vegetation.

When nutrients exceed the assimilative capacity of a water body, the ensuing eutrophic cycle can negatively impact in-stream dissolved oxygen (DO) levels. Through respiration, and the decomposition of dead plant matter, excessive algae and plant growth can reduce instream DO concentrations to levels that could negatively impact aquatic life. During the day, primary producers (*e.g.*, algae, plants) provide oxygen to the water as a by-product of photosynthesis. At night, however, when photosynthesis ceases but respiration continues, DO concentrations decline. Furthermore, as primary producers die, they are decomposed by bacteria that consume oxygen, and large populations of decomposers can consume large amounts of DO. Many aquatic insects, fish, and other organisms become stressed and may even die when DO levels drop below a particular threshold level.

Nutrient overenrichment of estuaries and nearshore coastal waters from human-based causes is now recognized as a national problem on the basis of Clean Water Act Section 305(b) reports from coastal States (EPA, 2001). Most of the nation's estuarine and coastal waters are moderately to severely polluted by excessive nutrients, especially nitrogen and phosphorus (NOAA, 2007; NOAA, 1999, EPA, 2006; EPA, 2004, EPA; and EPA, 2001). The State of Rhode Island has undertaken extensive efforts to reduce nitrogen discharges to Narragansett Bay proper to address eutrophic conditions there, with wastewater treatment facilities investing upward of $250 million on nitrogen removal upgrades. Letter from RI Governor Lincoln Chafee, December 22, 2014; see also Fact Sheet, Upper Blackstone Water Pollution Abatement District, NPDES No. MA0102369 (2008).

c. Water Quality Standards Applicable to the Taunton River Estuary and Mount Hope Bay

Under the MA SWQS, 314 CMR 4.00, surface waters are divided into water "use" classifications, including Class SA and SB for marine and coastal waters. The Taunton River Estuary and the eastern portion of Mount Hope Bay are classified as SB waters, with designations for Shellfishing (Restricted and Conditionally Restricted Shellfish Areas) and CSO. Class SB waters are designated as a "habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. In certain waters, habitat for fish, other aquatic life and wildlife may include, but is not limited to, seagrass. Where designated in the tables to 314 CMR 4.00 for shellfishing, these waters shall be suitable for shellfish harvesting with depuration (Restricted and Conditionally Restricted Shellfish Areas)." 314 CMR 4.05(4)(b). Waters in this classification "shall have consistently good aesthetic value." *Id.*

Class SB waters are subject to class-specific narrative and/or numeric water quality criteria. 314 CMR 4.05(4)(b)1 to 8. DO concentrations in Class SB waters "[s]hall not be less than 5.0 mg/l. Seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained. Where natural background conditions are lower, DO shall not be less than natural background."

The western portion of Mount Hope Bay is designated as a Class SA – Shellfishing water. These waters are designated as an excellent habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas, they shall be suitable for shellfish harvesting without depuration (Open Shellfish Areas). These waters shall have excellent aesthetic value. With respect to DO, the criteria for class SA waters is "not less than 6.0 mg/. Where natural background conditions are lower, DO shall not be less than the natural background. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained."

Both Class SA and Class SB waters are also subject to additional minimum standards applicable to all surface waters, as set forth at 314 CMR 4.05(5). With respect to nutrients, the MA SWQS provide:

> Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses.

314 CMR 4.05(5)(c). In addition, the MA SWQS require:

> Aesthetics – All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum, or other matter to form nuisances; produce objectionable odor, color, taste, or turbidity; or produce undesirable or nuisance species of aquatic life. 314 CMR 4.05(5)(a)

Massachusetts has not adopted numeric criteria for total nitrogen or other nutrients. MassDEP has, however, used a number of indicators in interpreting its narrative nutrient standard. The DEP/SMAST Massachusetts Estuaries Project report, *Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators - Interim Report* (Howes et al., 2003) (Critical Indicators Report), was developed to provide "a translator between the current narrative standard and nitrogen thresholds (as they relate to the ecological health of each embayment) which can be further refined based on the specific physical, chemical and biological characteristics of each embayment. This report is intended to provide a detailed discussion of the issue and types of indicators that can be used, as well as propose an acceptable range of nitrogen thresholds that will be used to interpret the current narrative standard." http://www.oceanscience.net/estuaries/pdf/nitroest.pdf. This interpretive guidance has been used in a number of TMDLs for estuarine waters in southeastern Massachusetts.

The Critical Indicators Report finds that the indicators of primary concern to be:

- plant presence and diversity (eelgrass, macroalgae, etc.)
- animal species presence and diversity (finfish, shellfish, infauna)
- nutrient concentrations (nitrogen species)

- chlorophyll-a concentration
- dissolved oxygen levels in the embayment water column

(Howes et al., 2003 at 11). With respect to total nitrogen, it concluded:

> It is not possible at this time to put quantitative nitrogen levels on each Water Quality Class. In fact, initial results of the Massachusetts Estuaries Project (Chatham Embayment Report 2003) indicate that the total nitrogen level associated with a particular ecological response can vary by over 1.4 fold (e.g. Stage Harbor versus Bassing Harbor in Chatham MA). Although between embayments nitrogen criteria may be different, it does appear that within a single embayment a consistent quantitative nitrogen criterion can be developed.

However, the Critical Indicators Report provides guidance for indicators, including total nitrogen, for various water quality classes. The nitrogen indicator ranges are based on long-term (>3 yr) average mid-ebb tide concentrations of total nitrogen (mg/L) in the water column. For "Excellent to Good" nitrogen related water quality conditions, equivalent to SA classification, the Report guidance is as follows: "Eelgrass beds are present, macroalgae is generally non-existent but in some cases may be present, benthic animal diversity and shellfish productivity are high, oxygen levels are generally not less than 6.0 mg/l with occasional depletions being rare (if at all), chlorophyll-a levels are in the 3 to 5 µg/L range. . . . For the case study, total nitrogen levels of 0.30-0.39 mg N/L were used to designate "excellent to good" quality areas." Id at 21-22.

For SB waters, the Critical Indicators Report provides the following guidance for indicators of unimpaired conditions, to be refined based on data from the specific embayments: "benthic animal diversity and shellfish productivity are high, oxygen levels are generally not less than 5.0 mg/l with depletions to <4 mg/L being infrequent, chlorophyll-a levels are in the 3 to 5 µg/L range and nitrogen levels are in the 0.39 - 0.50 range. . . . eelgrass is not present . . . and macroalgae is not present or present in limited amounts even though a good healthy aquatic community still exists." Id. at 22.

"Moderate Impairment" is indicated by "Shellfisheries may shift to more resistant species. Oxygen levels generally do not fall below 4 mg/L, although phytoplankton blooms raise chlorophyll a levels to around 10 µg/L. Eelgrass is not sustainable and macro-algae accumulations occur in some regions of the embayment. In the Case Study, embayment regions supporting total nitrogen levels >0.5 mg N/L were clearly impaired." Significant Impairment is indicated by total nitrogen concentrations of 0.6/0.7 mg/l and above. In "severely degraded" conditions, "algal blooms are typical with chlorophyll-a levels generally >20 µg/L, oxygen depletions to hypoxic levels are common, there are periodic fish kills, and macro-algal accumulations occur with both ecological and aesthetic impacts."

In addition to the Massachusetts water quality standards, water quality standards applicable to the Rhode Island portion of Mount Hope Bay must also be satisfied. As in Massachusetts, the Rhode Island portions of Mount Hope Bay are designated SB waters in the eastern portion and SA waters in the western portion of the Bay. Rhode Island, like Massachusetts, has specific numeric criteria for DO in SA and SB waters[11], and narrative criteria for nutrients[12] and aesthetics.[13] The Rhode Island portions of Mount Hope Bay, like the Massachusetts portions are listed for impairments due to total nitrogen, dissolved oxygen (as well as fishes bioassessments and temperature impairments linked to the Brayton Point power plant). As discussed below, permit limits designed to meet water quality standards in the Taunton River Estuary and the Massachusetts portions of Mount Hope Bay are expected to achieve water quality standards in Rhode Island.

d. Receiving Water Quality Violations

The Taunton River Estuary and Mount Hope Bay have reached their assimilative capacity for nitrogen and are suffering from the adverse water quality impacts of nutrient overenrichment, including cultural eutrophication. They are, consequently, failing to attain the water quality standards described above. The impacts of excessive nutrients are evident throughout the Taunton River Estuary and Mount Hope Bay as indicated by historic studies, a comprehensive monitoring study of the Taunton River Estuary/Mount Hope Bay in 2004-06, and ongoing (to the present) monitoring conducted as part of the larger Narragansett Bay monitoring program.

Both Massachusetts and Rhode Island have documented these impairments in their reporting on impaired waters. Section 303(d) of the CWA requires states to identify those waterbodies that are not expected to meet surface water quality standards after implementation of technology-based controls. The State of Massachusetts has identified Mount Hope Bay and the lower

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[11] Rule 8.D.3. Table 3. For waters with a seasonal pynocline, no less than 4.8 mg/l above the seasonal pynocline; below the seasonal pynocline DO concentrations above 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be (1) Less than 2.9 mg/l for more than 24 consecutive hours during the recruitment season; nor (2) Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor (3) Shall they exceed the allowable cumulative DO exposure (Table 3.A).

For waters without a seasonal pycnocline, DO concentrations above 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be: (1) Less than 3.0 mg/l for more than 24 consecutive hours during the recruitment season; nor (2) Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor (3) Shall they exceed the allowable cumulative DO exposure presented (Table 3.A. and Table 3.B).

[12] Rule 8.D.1(d). Nutrients - Nutrients shall not exceed the limitations specified in rule 8.D.(2) (freshwaters) and 8.D.(3) (seawaters) and/or more stringent site-specific limits necessary to prevent or minimize accelerated or cultural eutrophication.

Rule 8.D.3. None in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication. Shall not exceed site-specific limits if deemed necessary by the Director to prevent or minimize accelerated or cultural eutrophication. Total phosphorus, nitrates and ammonia may be assigned site-specific permit limits based on reasonable Best Available Technologies. Where waters have low tidal flushing rates, applicable treatment to prevent or minimize accelerated or cultural eutrophication may be required for regulated nonpoint source activities.

[13] Rule 8.D.1(b)(iv). Aesthetics - all waters shall be free from pollutants in concentrations or combinations that: iv. Result in the dominance of species of fish and wildlife to such a degree as to create a nuisance or interfere with the existing or designated uses.

reaches of the Taunton River Estuary for impairments due to low dissolved oxygen, with Total Nitrogen specifically identified as a cause of impairments in Mount Hope Bay.

Early studies focused predominantly on Narragansett Bay proper, rather than Mount Hope Bay, and established the need for significant nitrogen reductions in order to address eutrophication in the system, as evidenced by high chlorophyll-a concentrations and pervasive DO depletions. The state of Rhode Island established a legislative goal of a 50% reduction in nitrogen discharges to Narragansett Bay, which has been implemented through permit limits on total nitrogen. Early studies also indicated the need for nitrogen reductions in Mount Hope Bay, although additional study was needed for setting reduction targets. See e.g. Isaac, R.A., Estimation of Nutrient Loadings and Their Impacts on Dissolved Oxygen Demonstrated at Mount Hope Bay, 23 *Environment International* 151 (1997).

To remedy the paucity of data in Mount Hope Bay and the Taunton River Estuary, a three-year water quality monitoring study was conducted by the School for Marine Science and Technology at UMass-Dartmouth (SMAST) with funding and oversight from MassDEP. The study involved monthly sampling at 22 sites across Mount Hope Bay and the Taunton River Estuary from 2004 to 2006 (see Figure 5).[14] This study showed that average chlorophyll-a over the three year period was above 10 ug/l at all monitoring stations across the Taunton River Estuary and Mount Hope Bay. The 20th percentile DO concentrations for the three year period were below the 5.0 mg/l water quality standard at four of the six sites in the Taunton River Estuary.[15] Table 4, reproduced from SMAST, *Summary of Water Quality Monitoring Program for the Mount Hope Bay Embayment System (2004 – 2006)* at 24 (August 16, 2007).

[14] This monitoring program forms the baseline of EPA's load analysis due to the comprehensive nature of the available data and the quality assurance provided by MassDEP oversight, including data collection and analysis under an approved QAPP.
[15] The six Taunton River stations are MHB 1, 2 and 18-21; MHB 2, 18, 19 and 21 had 20% low DO below 5.0 mg/l for the three year period.

Figure 5. Mount Hope Bay Monitoring Program estuarine stations.

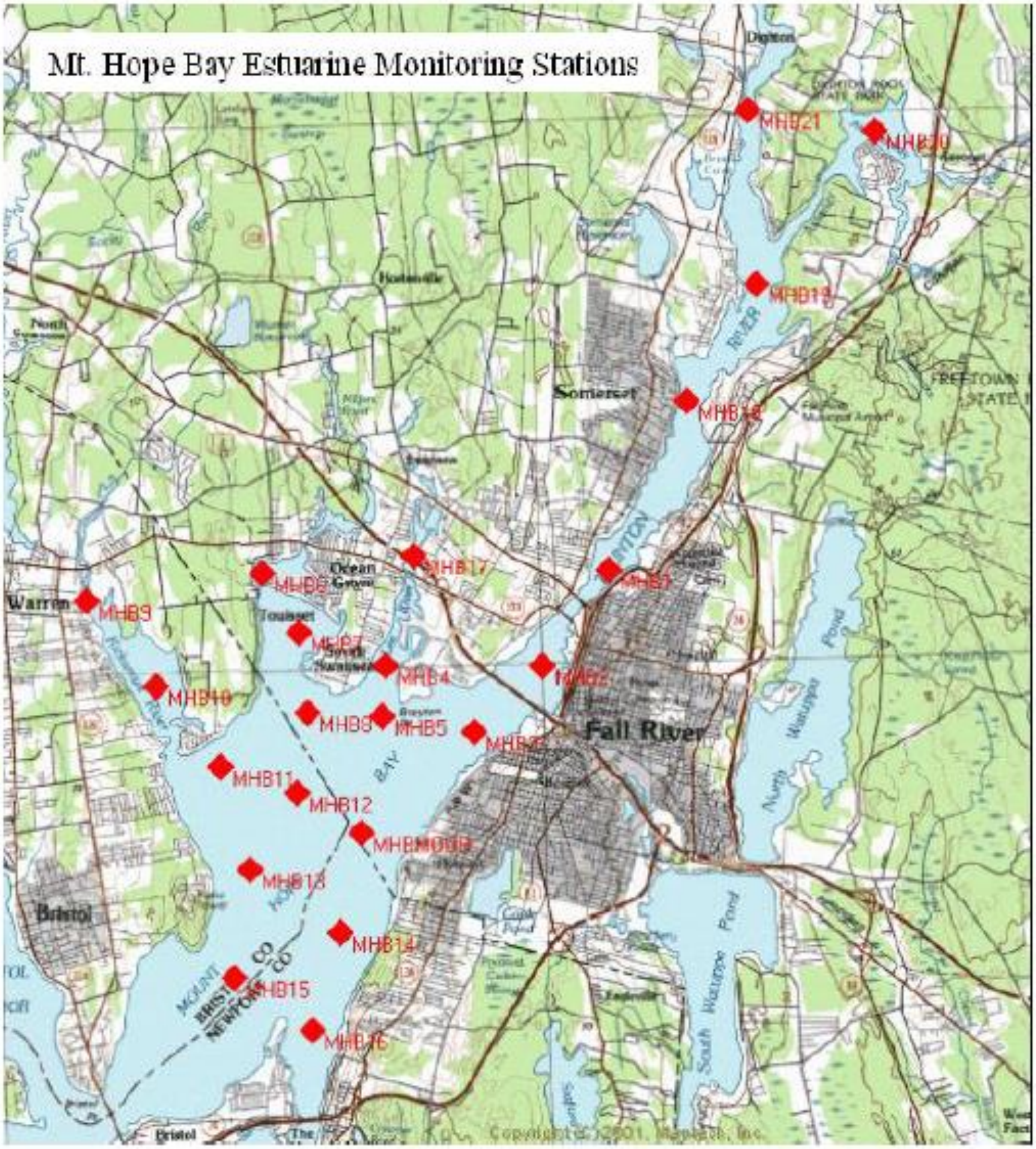


Table 4. Mount Hope Bay Monitoring Program results as reported in SMAST, 2007.

Table 5. Summary of average levels of primary nutrient related water quality parameters measured in the summers of 2004, 2005 and 2006 in Mount Hope Bay by SMAST Coastal Systems staff.

Station	Total Depth (m)	20% Low* D.O. (mg/L)	Sal (ppt)	PO4 (mg/L)	NH4 (mg/L)	NOX (mg/L)	DIN (mg/L)	DON (mg/L)	PON (mg/L)	TN (mg/L)	DIN/DIP Molar Ratio	Total Chl a (ug/L)
MHB1	10.0	5.02	23.3	0.054	0.052	0.095	0.147	0.299	0.155	0.601	6	11.75
MHB2	8.9	4.94	26.1	0.052	0.047	0.043	0.090	0.312	0.170	0.572	4	13.50
MHB3	5.2	5.49	26.0	0.051	0.037	0.035	0.072	0.282	0.163	0.517	3	14.32
MHB4	3.5	5.61	25.7	0.052	0.026	0.017	0.043	0.308	0.173	0.525	3	14.71
MHB5	5.6	5.20	26.2	0.050	0.029	0.020	0.050	0.294	0.169	0.512	2	14.53
MHB6	3.9	5.09	24.1	0.061	0.049	0.030	0.079	0.359	0.168	0.606	3	12.87
MHB7	4.5	5.94	25.5	0.049	0.023	0.016	0.039	0.308	0.189	0.536	2	17.46
MHB8	5.1	4.93	25.8	0.046	0.022	0.019	0.041	0.280	0.165	0.486	2	15.84
MHB9	ND	ND	19.7	0.062	0.049	0.040	0.089	0.453	0.263	0.805	3	14.02
MHB10	3.2	5.86	25.7	0.048	0.017	0.012	0.027	0.314	0.167	0.508	1	14.11
MHB11	4.9	5.02	26.2	0.043	0.017	0.012	0.029	0.268	0.175	0.472	1	16.23
MHB12	5.0	5.36	26.4	0.049	0.020	0.021	0.040	0.284	0.168	0.493	2	16.12
MHB13	5.9	6.00	26.8	0.045	0.020	0.013	0.033	0.282	0.158	0.473	2	15.40
MHB14	6.5	5.34	27.0	0.044	0.024	0.009	0.033	0.289	0.197	0.519	2	16.78
MHB15	12.9	6.46	27.9	0.035	0.021	0.009	0.029	0.273	0.143	0.445	2	12.68
MHB16	11.2	6.33	27.7	0.043	0.028	0.012	0.039	0.265	0.157	0.461	2	13.02
MHB17	ND	ND	24.6	0.064	0.057	0.026	0.083	0.404	0.181	0.669	3	11.81
MHB18	6.7	4.96	22.3	0.062	0.061	0.136	0.197	0.300	0.156	0.652	7	11.44
MHB19	4.0	4.93	18.7	0.058	0.074	0.201	0.275	0.342	0.178	0.799	10	12.27
MHB20	1.8	5.09	17.5	0.054	0.063	0.144	0.207	0.372	0.192	0.771	8	13.59
MHB21	2.6	4.60	14.2	0.061	0.066	0.350	0.415	0.420	0.219	1.058	15	13.34
MHBMOOR	6.3	5.85	26.8	0.045	0.025	0.013	0.038	0.284	0.181	0.503	2	15.57

* Average of the lowest 20% of recorded values

Table 5 below shows the results of the SMAST monitoring for each of the three years of the monitoring program, with the Taunton River stations highlighted. Minimum measured DO concentrations in each year were below 5.0 mg/l at all the Taunton River stations in 2004 and 2006, and a majority of those stations in 2005. In Mount Hope Bay proper, minimum DO concentrations below 5.0 mg/l were encountered at all but one of the Mount Hope Bay stations at least once during the three year period, and at five of the ten stations in both 2004 and 2005. This is compelling evidence of pervasive low DO conditions throughout the Taunton River Estuary and Mount Hope Bay, given that the sampling was intermittent (and therefore unlikely to capture isolated low DO events) and was not timed to reflect the lowest DO conditions in the waterbody (just before dawn, when oxygen depletion due to respiration is greatest).

Elevated chlorophyll-a concentrations are similarly pervasive based on the SMAST monitoring data. Mean chlorophyll-a concentrations are above the Critical Indicators Report guidelines for unimpaired waters (3-5 ug/l) at every station monitored, in all three of the monitoring seasons. See Table 5. Maximum chlorophyll-a concentrations are routinely above 20 ug/l, far exceeding the chlorophyll concentrations found in unimpaired waters. Again, given the likelihood of intermittent sampling missing the worst conditions in terms of algal blooms, this is compelling evidence of pervasive eutrophic conditions throughout the Taunton River Estuary and Mount Hope Bay.

The study showed total nitrogen concentrations are elevated throughout the system, with a three year average TN concentration above 0.5 mg/l at sixteen of the 22 sites and above 0.45 mg/l at 21 of 22 sites. SMAST, 2007. Total Nitrogen concentrations are generally highest in the tidal rivers, including the Taunton River (e.g. Station 19, TN range 0.66 to 0.99 mg/l). Molar N/P ratios are consistent with nitrogen limitation (≤ 10 at all stations other than MHB21, the uppermost Taunton River station).

Table 5. SMAST Monitoring Data Summarized by Year. Taunton River stations highlighted.

			2004				2005				2006			
Station	**Location**	**State**	**DO min (mg/l)**	**Chl-a max (ug/l)**	**Chl-a mean (ug/l)**	**TN mean (mg/l)**	**DO min (mg/l)**	**Chl-a max (ug/l)**	**Chl-a mean (ug/l)**	**TN mean (mg/l)**	**DO min (mg/l)**	**Chl-a max (ug/l)**	**Chl-a mean (ug/l)**	**TN mean (mg/l)**
1	Taunton River	MA	4.8	24.2	7.8	0.53	5.1	49.2	10.9	0.56	4.1	26.6	10.3	0.74
2	Taunton River	MA	4.7	33.2	9.6	0.53	5.0	16.6	8.2	0.51	3.0	48.6	14.2	0.68
3	MHB proper (61-06)	MA	5.1	65.1	11.9	0.51	5.2	20.0	10.2	0.45	4.8	41.5	16.8	0.60
4	Lee River	MA	4.7	19.5	10.5	0.51	5.1	16.0	10.8	0.48	6.1	28.6	16.3	0.59
5	MHB proper (61-07)	MA	4.7	22.4	10.5	0.48	4.6	22.6	11.7	0.49	5.1	29.7	14.3	0.57
6	Cole River	MA	4.9	26.4	11.1	0.52	4.7	16.0	11.0	0.56	5.3	18.6	8.5	0.74
7	MHB proper (61-07)	MA	3.4	37.2	14.2	0.47	5.3	22.3	13.3	0.54	7.1	24.9	16.2	0.60
8	MHB proper (61-07)	MA	3.8	38.8	12.7	0.46	2.6	27.5	11.8	0.45	5.6	32.7	14.1	0.55
9	Kickamut River	RI	No data	19.1	11.9	0.70	No Data	17.7	9.7	0.73	No data	33.1	13.1	1.03
10	Kickamut River	RI	6.0	12.5	8.5	0.48	5.4	29.9	13.6	0.49	5.4	28.9	14.6	0.57
11	MHB-proper	RI	3.2	26.3	10.4	0.44	4.5	33.2	14.3	0.45	5.5	35.6	17.1	0.53
12	MHB-proper	RI	4.0	29.2	10.8	0.45	4.0	29.6	14.4	0.50	5.4	36.4	14.1	0.52
13	MHB-proper	RI	6.5	25.8	11.2	0.42	4.1	27.9	13.4	0.46	6.2	26.5	13.7	0.53
14	MHB-proper	RI	6.0	36.8	14.2	0.58	6.1	32.4	12.1	0.41	2.1	80.6	19.4	0.57
15	MHB-proper	RI	6.9	23.1	9.8	0.45	6.3	23.6	8.8	0.42	4.3	42.4	14.5	0.46
16	MHB-proper	RI	6.2	25.5	10.5	0.45	6.0	33.3	10.3	0.44	5.3	30.4	14.1	0.50
17	Lee River	MA	No data	9.2	4.7	0.65	No Data	17.3	7.9	0.61	No data	27.2	13.8	0.76
18	Taunton River	MA	4.7	16.1	7.5	0.61	4.4	38.0	9.0	0.60	4.3	12.9	7.2	0.80
19	Taunton River	MA	4.4	27.0	10.8	0.72	4.7	33.2	10.5	0.73	4.6	15.0	5.5	0.99
20	Assonet River	MA	5.1	15.7	9.1	0.72	5.6	27.1	12.2	0.63	4.8	16.9	7.6	0.94
21	Taunton River	MA	3.8	23.1	10.5	0.98	4.1	19.8	10.5	1.04	4.8	14.3	5.9	1.24
MOOR	MHB proper (61-06)	MA	6.3	21.4	11.4	0.51	5.4	19.9	11.5	0.45	2.7	35.4	16.5	0.55

Based on these data, the SMAST report concluded that a Massachusetts Estuaries Project ("MEP") analysis of nitrogen loading was warranted for restoration of the Mount Hope Bay/Taunton River complex, stating:

> Given the high population within the watershed and resultant N loading to this down gradient estuary and the observed high chlorophyll levels and oxygen depletions, it is not surprising that nitrogen levels are moderately to highly enriched over offshore waters. The Taunton River estuarine reach, as the focus of upper watershed N loading, showed very high total nitrogen levels (TN) in its upper reach (1.058 mg N L^{-1}) and maintained high levels throughout most of its reach (>0.6 mg N L^{-1}). The main basin of Mt. Hope Bay supported lower TN levels primarily as a result of mixing with incoming waters (generally 0.5-0.6 mg N L^{-1}). This is consistent with the observed oxygen depletions and infauna animal communities. The highest (Moderate) water quality was found at the stations in the main basin and lower reaches of Mt Hope Bay out to the channels to lower Narragansett Bay and the Sakonet River.
>
> . . .
>
> In general, the Taunton River Estuary, with its large watershed N load and high TN levels, is showing poor water quality due to its high chlorophyll and oxygen depletions. The main basin of Mt. Hope Bay, with its greater flushing and access to higher quality waters of the lower Bay, is showing less impairment with moderate water quality. Finally, the lower basin of Mt. Hope Bay, nearest the tidal "inlet", is generally showing moderate water quality. . . . [T]hese data indicate that the MEP analysis of this system should focus on restoration of the main basin of Mt. Hope Bay and the Taunton River estuarine reach, and that it is likely that restoration of the Taunton River Estuary will have a significant positive effect on the habitat quality of the main basin of Mt. Hope Bay.

To date, the MEP analysis, along with the TMDL that would result from the analysis, has not been completed.[16]

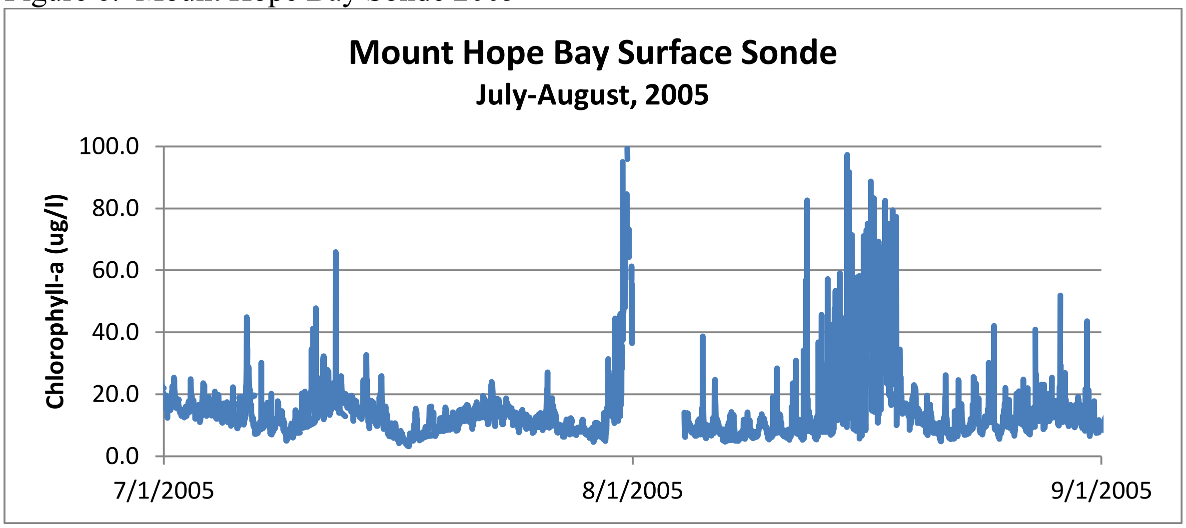
Additional evidence of conditions in Mount Hope Bay is provided from the Narragansett Bay Water Quality Network fixed monitoring station in the Bay, equipped with two datasondes that measured temperature, salinity, dissolved oxygen and depth at approximately 1 meter from the bottom and 0.5 meters below the surface, and chlorophyll fluorescence at the near surface sonde. (http://www.narrbay.org/d_projects/buoy/buoydata.htm). The datasondes were deployed in the Rhode Island portion of Mount Hope Bay near SMAST site MHB13, from May or June through October, from 2005 through 2014. Analysis of the DO data from the deep sonde at this site in 2005 and 2006 showed multiple events (three in 2005; seven in 2006) of DO depletion below the 4.8 mg/l RI water quality threshold, with individual events lasting between two and twelve days.

[16] EPA is required to issue the permit with limits and conditions necessary to ensure compliance with State water quality standards at the time of permit reissuance. Neither the CWA nor EPA regulations require that a TMDL be completed before a water quality-based limit may be included in a permit. Rather, water quality-based effluent limitations in NPDES permits must be "consistent with the assumptions and requirements of any *available* [emphasis added] wasteload allocation." 40 C.F.R. § 122.44(d)(1)(vii)(B). Thus, an approved TMDL is not a precondition to the issuance of an NPDES permit for discharges to an impaired waterway; nor does EPA have discretion to wait for the issuance of a TMDL to include effluent limitation on discharges of pollutants that contribute to impairments.

Codiga et al, "Narragansett Bay Hypoxic Even Characteristics Based on Fixed-Site Monitoring Network Time Series: Intermittency, Geographic Distribution, Spatial Synchronicity, and Interannual Variability," *Estuaries and Coasts* 32:621-641 (2009). Two of the 2006 events were characterized as "hypoxic", with DO concentrations less than 2.9 mg/l persisting for over two days. Id.

The sonde data also confirms the occurrence of algal blooms and generally elevated chlorophyll-a concentrations in Mount Hope Bay. The 2005 sonde data, Figure 6, shows multiple events with chlorophyll-a concentrations well above 20 ug/l, and above the maximum concentrations captured with the intermittent SMAST sampling.

Figure 6. Mount Hope Bay Sonde 2005



Charts by EPA. Source data: Narragansett Bay Fixed-Site Monitoring Network (NBFSMN), 2005. 2005 Datasets. Rhode Island Department of Environmental Management, Office of Water Resources. Data available at www.dem.ri.gov/bart

The sonde monitoring also confirms that these water quality violations continue to the present. The most recent published continuous data (for 2011) show elevated chlorophyll-a concentrations, corresponding periods of supersaturated DO at the surface, persistent bottom DO concentrations below 5 mg/l and frequent excursions below 3 mg/l. *See* Figure 7.

Figure 7a. Surface Chlorophyll and DO percent saturation, 2011

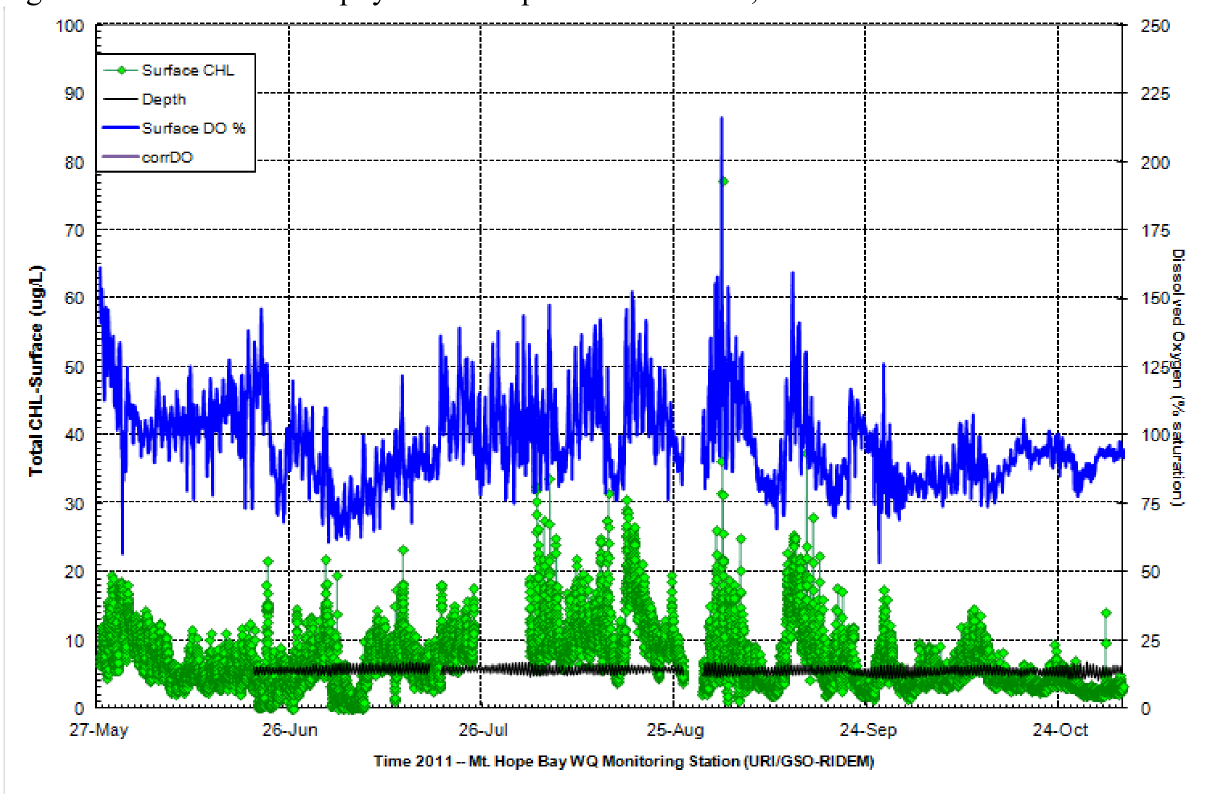
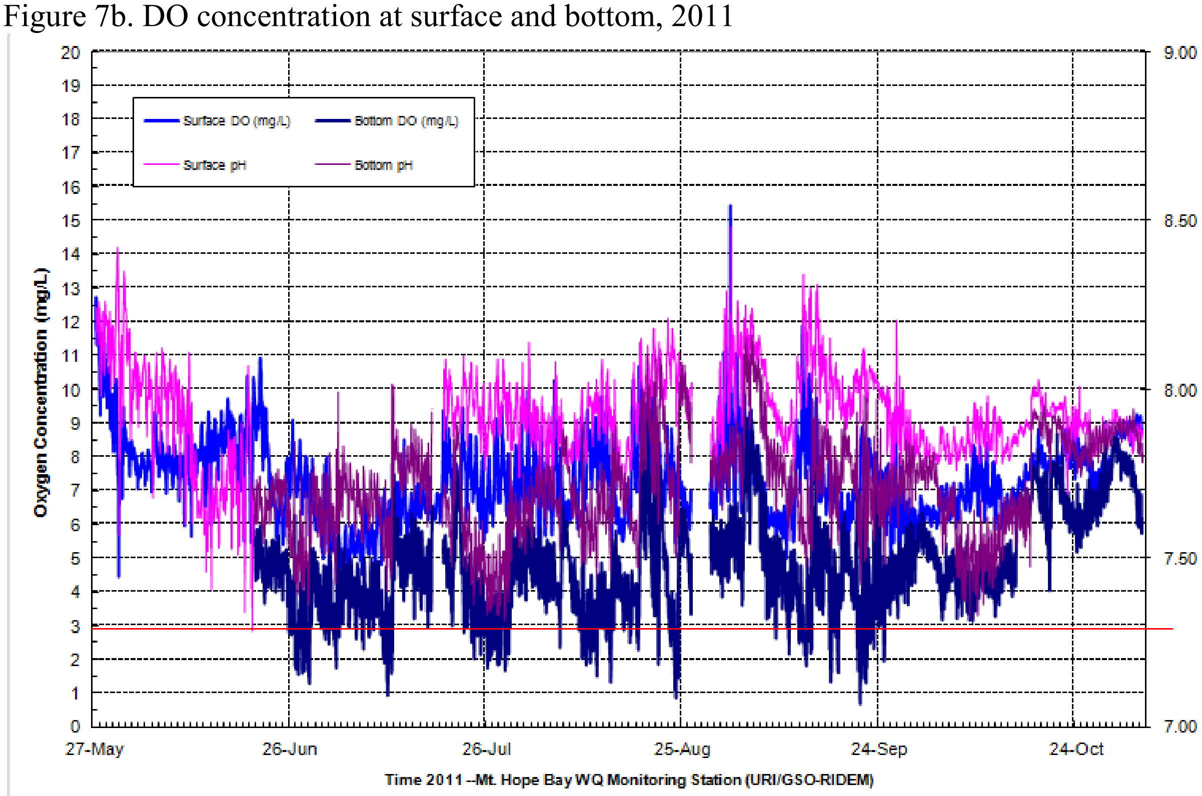


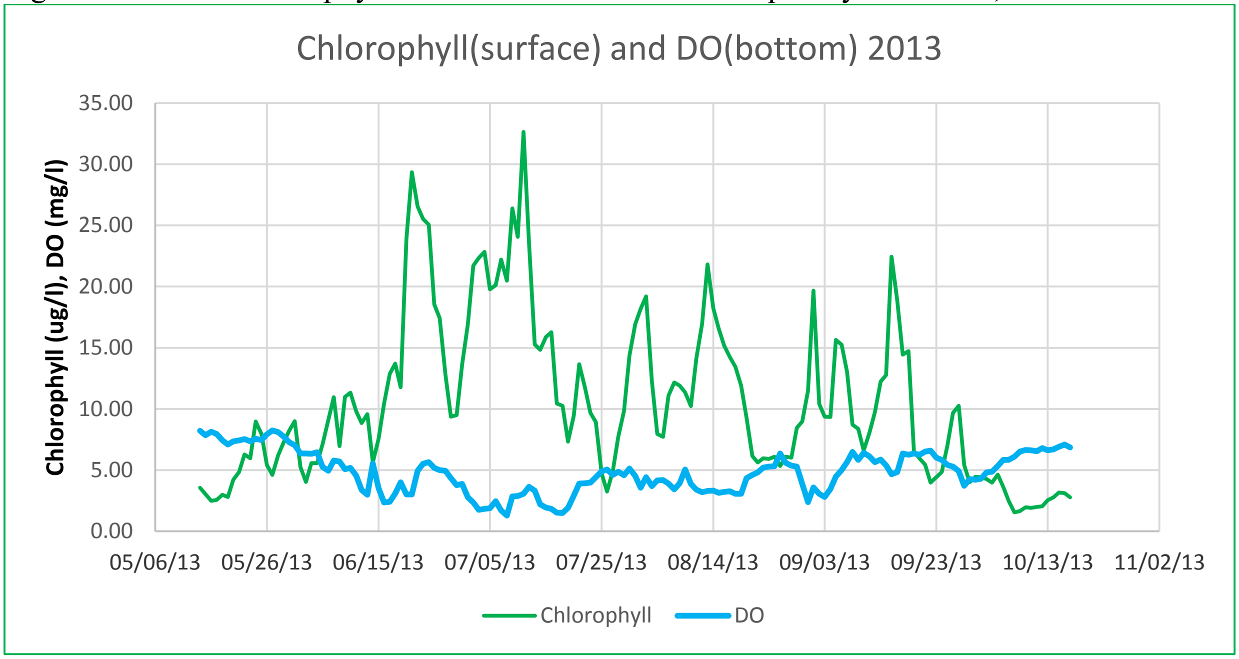
Figure 7b. DO concentration at surface and bottom, 2011



Charts by URI/GSO-RIDEM. Chart and data available at www.dem.ri.gov/bart

In addition daily average data has been published through 2013, and confirms continued elevated algae with accompanying extended periods of low DO, consistent with continuing nutrient impacts. In 2013 most of the summer had daily average DO below the 5.0 mg/l Massachusetts DO standard, and extensive periods below the 2.8 mg/l threshold in Rhode Island water quality standards.

Figure 8. Surface chlorophyll and bottom DO at Mount Hope Bay datasonde, 2013.



Based on these data, EPA has concluded that cultural eutrophication due to nitrogen overenrichment in the Taunton River Estuary and Mount Hope Bay has reached and continues to exhibit the level of a violation of both Massachusetts and Rhode Island water quality standards for nutrients and aesthetics, and has also resulted in violations of the numeric DO standards in these waters.

e. Reasonable Potential Analysis

Pursuant to 40 C.F.R. § 122.44(d)(1), NPDES permits must contain any requirements in addition to technology-based limits necessary to achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. In addition, limitations "must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) that the Director has determined are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality" (40 C.F.R. § 122.44(d)(1)(i)). An excursion occurs if the actual or projected instream data exceeds any numeric or narrative water quality criterion.

To determine the extent of the facility's contribution to the violation of the MA SWQS, EPA performed an analysis of nitrogen loading to the Taunton River Estuary using as a baseline data from the SMAST monitoring program, which included monitoring on the Taunton River and major tributaries to the Taunton River Estuary, in additional to the estuarine stations. These data represent the most comprehensive dataset available for the Mount Hope Bay and Taunton River Estuary system. The analysis focuses on the Taunton River Estuary because that area shows the greatest eutrophication impacts and greatest nitrogen concentrations. Using the 2004-2005 to representative a "typical year" based on precipitation data,[17] EPA used the USGS LOADEST program to calculate a calculate a seasonal average (June to September) nitrogen load for the Taunton River and each tributary using measured nitrogen concentrations and flow for several discrete events. A description of the LOADEST analysis is provided in Attachment A.

EPA also calculated the point source loads to the Taunton River Estuary derived from wastewater treatment plants based on DMR data from each facility from June through September 2004-05. These include direct discharges to the Taunton River Estuary (Taunton and Somerset WWTPs), and discharges to the tributaries from other POTWs, which are a component of the tributary loads calculated above. For POTWs discharging to tributaries to the Taunton River, an attenuation factor was applied to account for instream uptake of nitrogen. A description of the attenuation calculation is provided in Attachment B. Attenuation was determined to range from four to eighteen percent for the major (> 1 mgd) facilities located on tributaries (eleven percent for Brockton, the largest discharger), with higher attenuation for some of the smaller facilities on smaller tributaries. Table 6 shows the point sources, the receiving stream, their nitrogen discharges and the delivered load to the estuary.

[17] Rainfall during the summers of 2004 and 2005 totalled 17.82 and 11.03 inches respectively (http://weather-warehouse.com/WeatherHistory/PastWeatherData_TauntonMuniArpt_EastTaunton_MA_September.html), compared to a long term average of 15.24 inches (http://www.weather.com/weather/wxclimatology/monthly/graph/02780). The third monitoring year, 2006, was excluded because extremely high rainfall in May and June (over 9 inches per month, or more than twice the long term average) has potential to disturb the "steady-state" assumption that underlies EPA's load analysis.

Table 6. Point Source Discharges and Delivered Loads

WWTF	Design Flow (MGD)	Receiving stream	Average 2004-05 Summer TN discharged (lb/d)	Average 2004-05 Summer TN delivered to Estuary (lb/d)
Direct discharges to Estuary				
Taunton	8.4	Taunton River Estuary	610	610
Somerset	4.2	Taunton River Estuary	349.5	349.5
			Total direct point source load:	959
Upstream discharges				
MCI Bridgewater	0.55	Taunton River	37	33
Brockton	18	Salisbury Plain River	1303	1160
Bridgewater	1.44	Town River	137.5	132
Dighton-Rehoboth Schools	0.01	Segregansett River	1	1
Mansfield	3.14	Three Mile River	375.5	312
Middleboro	2.16	Nemasket River	207.5	191
Wheaton College	0.12	Three Mile River	6	3
Oak Point	0.18	Bartlett Brook	9	8
East Bridgewater High School	0.01	Matfield River	1.5	1
			Total upstream point source load:	1841

Finally, EPA calculated total loads to the estuary and allocated those loads between point sources and nonpoint sources. For upstream loads, nonpoint sources were calculated by subtracting the delivered point source loads from the LOADEST total load. Nonpoint source loads from the watershed area downstream of the SMAST monitoring sites, not accounted for in the LOADEST analysis, were calculated using an areal loading factor derived from the LOADEST loading figures. Direct atmospheric deposition to the Taunton River Estuary was not included in the model as it is a relatively small contribution given the relatively small area of the estuary.[18] The average summer load to the estuary in 2004 to 2005 is 4,228 lbs/day.

Table 7 and Figure 9 show the total watershed nitrogen loads to the Taunton River Estuary in the baseline analysis. Wastewater treatment plant loads make up 66% of the total nitrogen load. Nonpoint sources make up the remaining 34%. The Brockton AWRF load, at 1,303 lbs/day, was approximately 31% of the total nitrogen load.

EPA also considered the impacts of changes since the 2004-05 baseline. Specifically, (the Brockton AWRF was upgraded as of 2010, reducing its total nitrogen load discharges from 1303 lbs/day to an average of 527 lbs/day in 2012-13. This is reduction reduces delivered loads from the baseline of 4,228 lbs/day to 3537 lbs/day. The load from Brockton is a smaller percentage of that total, but would still make up approximately 13% of total loads. Monitoring done by the Narragansett Bay Commission on the Taunton River also indicate continuing high total nitrogen

[18] Atmospheric deposition to the watershed is included in the nonpoint source loading figures.

concentrations, consistent with EPA's analysis, with TN concentrations at the Berkley Bridge in Dighton ranging between 0.6 to 2.7 mg/l (median 1.06 mg/l) in 2014. NBC River and Bay Nutrients Data, http://snapshot.narrabay.com/app/MonitoringInitiatives/NutrientMonitoring. (Unfortunately the NBC data includes total nitrogen only since mid-2013, and the monitoring data is from an estuarine portion of the river so is influenced by dilution by marine waters, so that trends over time and direct comparison to SMAST baseline data are not possible.)

Figure 9. Taunton River Estuary Loads by Category

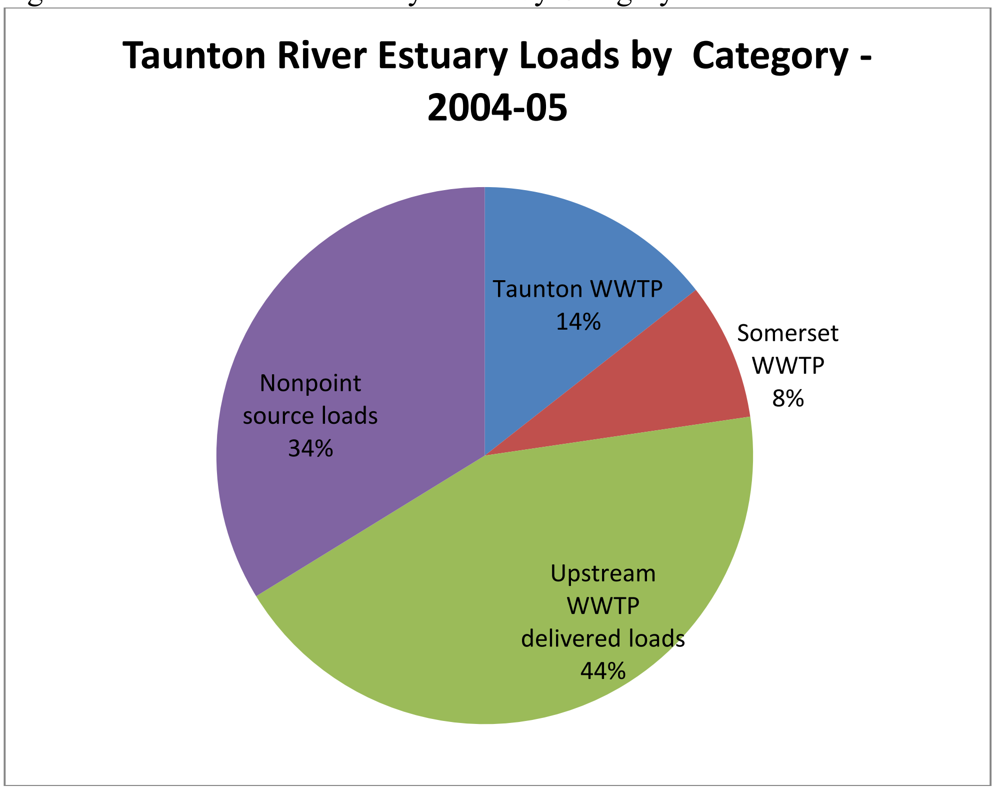


Table 7. Taunton River Estuary Loads by Category

Total loads	**Avg 2004-05 Summer Load (lb/d)**
Taunton WWTP	610
Somerset WWTP	350
Upstream WWTP delivered loads	1841
Nonpoint source loads	1428
Total	4228

On this basis, EPA concludes that the Brockton AWRF's nitrogen discharges "cause, have a reasonable potential to cause, or contribute" to nitrogen-related water quality violations in the Taunton River Estuary. Therefore, an effluent limit must be included in the permit.

EPA notes that the reduction in loads associated with the Brockton AWRF upgrade has resulted in about a 17% reduction in the total load to the Taunton River estuary. EPA commends this voluntary reduction, which is a significant step (although not sufficient in itself, see section f.ii below) towards achieving the necessary load reductions in this watershed.

f. Effluent limitation calculation

EPA's calculation of an effluent limitation for nitrogen consists of two parts. First, EPA determines a threshold nitrogen concentration in the water body that is consistent with unimpaired conditions. Second, EPA determines the allowable load from watershed sources generally, and this facility specifically, that will result in receiving water concentrations at or below the allowable threshold.

i. Threshold nitrogen concentration

To determine an appropriate threshold concentration, EPA applies the procedure developed by the Massachusetts Estuaries Project ("MEP") of identifying a target nitrogen concentration threshold based on a location within the estuary where water quality standards are not violated, in order to identify a nitrogen concentration consistent with unimpaired conditions. See, e.g., SMAST/MassDEP, Massachusetts Estuaries Project Linked Watershed-Embayment Modeling to Determine Critical Nitrogen Loading Thresholds for Stage Harbor, Sulphur Springs, Taylors Pond, Bassing Harbor and Muddy Creek, Chatham, MA (2003) at 227 ("the nitrogen level associated with high and stable habitat quality typically derived from a lower reach of the same system or an adjacent embayment is used as the nitrogen concentration target").[19] This approach is consistent with EPA guidance regarding the use of reference conditions for the purposes of developing nutrient water quality criteria. The MEP process also distinguishes areas where eelgrass restoration is targeted, which generally require much lower TN concentrations. The Taunton River Estuary is classified as an SB water and is not a location where eelgrass has historically been found.[20] Therefore the primary water quality parameter considered in determining a reference location is protection of DO conditions, with algae growth (chlorophyll) and water clarity also considered. EPA notes that concentrations previously found to be protective of DO in other southeastern Massachusetts estuaries have ranged between 0.35 and 0.55 mg/l.[21]

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[19] The Massachusetts Estuaries Project use the term "sentinel" location to describe the critical location(s) that are targeted for nitrogen reductions, such that "restoration or protection of the sentinel sub-embayment will necessarily create high quality habitat throughout the estuary."

[20] Known historic eelgrass locations within Mount Hope Bay are located on the western portion of the Bay, including the mouths of the Kickamuit, Cole and Lee Rivers, and in the Sakkonet River. See Restoration Sites and Historical Eelgrass Distribution in Narragansett Bay, Rhode Island (2001), http://www.edc.uri.edu/restoration/images/maps/historiceelgrass.pdf . Water quality based TN thresholds would be lower in those areas to protect eelgrass habitat. The DO-based thresholds used for development of permit limits will also protect eelgrass in those locations due to much greater dilution of the Taunton River discharges in those areas of the Bay.

[21] See, e.g. MassDEP, *FINAL West Falmouth Harbor Embayment System Total Maximum Daily Loads For Total Nitrogen* (2007) (Harbor Head threshold 0.35 – SA water); MassDEP, *Oyster Pond Embayment System Total Maximum Daily Loads For Total Nitrogen* (2008) (threshold 0.55).

Data from the SMAST monitoring program indicates widespread DO violations at a range of TN concentrations. Table 5 of the SMAST report (Table 4 of this Fact Sheet above) provides the three year period 20% low DO concentration, which was below the 5 mg/l water quality standard at four stations, with long term average TN concentrations ranging from 0.486 to 1.058 mg/l. However, EPA does not consider a three year, 20% low DO to be a sufficiently sensitive indicator of water quality violations because the water quality criteria are based on a minimum DO concentration of 5 mg/l.

Closer examination of the SMAST monitoring data indicates multiple stations with minimum DO violations during the year with corresponding TN mean concentrations below 0.48 mg/l. Indeed minimum DO concentrations of less than 5.0 mg/l were encountered at all but one site (MHB16) during the three year monitoring program. See Table 5.

In addition, DO concentrations from the fixed site monitoring station indicate extensive periods with DO below 5.0 mg/l in 2005 and 2006 (the datasonde was not operating in 2004). EPA considers fixed site monitoring to be superior to intermittent sampling data with respect to DO concentrations because the continuous monitoring includes critical conditions and time periods (e.g. early morning DO minimums) that are generally missed in intermittent sampling. The SMAST monitoring station that is closest to the fixed site station is MHB13. The average TN concentration at MHB13 between 2004 and 2006 was 0.473 mg/l, indicating that the threshold concentration must be lower than that value.

This is consistent with SMAST findings based on the entire tropic health index, which includes indices for water clarity (secchi depth) and algae. SMAST determined that stations MHB15 and MHB16 had the highest eutrophication index values, consistent with moderate water quality. See Table 7 of the SMAST report which is shown as Figure 10 of this Fact Sheet..

Figure 10. SMAST Trophic health index scores for Mount Hope Bay

Table 7 Trophic health index scores and status for water quality monitoring stations, Mt. Hope Bay, 2004-2006 (described in Howes et al. 1999 and also at www.savebuzzardsbay.org.)

Station	Secchi SCORE	Low20% Oxsat SCORE	DIN SCORE	TON SCORE	T-Pig SCORE	EUTRO Index	Health Status
MHB1	52.2	57.8	0.0	36.5	0.0	29	Fair/Poor
MHB2	67.7	58.5	19.3	28.7	0.0	35	Mod/Fair
MHB3	62.1	79.4	29.0	39.1	0.0	42	Mod
MHB4	62.0	79.0	51.5	28.7	0.0	44	Mod
MHB5	61.2	71.8	44.9	34.2	0.0	42	Mod
MHB6	65.7	73.5	24.9	17.0	0.0	36	Mod/Fair
MHB7	61.5	87.9	55.4	24.8	0.0	46	Mod
MHB8	61.7	65.3	53.5	39.1	0.0	44	Mod
MHB9	ND	ND	19.6	0.0	0.0	ND	ND
MHB10	60.4	89.4	70.7	29.1	0.0	50	Mod
MHB11	61.6	66.2	68.5	39.8	0.0	47	Mod
MHB12	58.5	78.2	54.1	37.1	0.0	46	Mod
MHB13	57.4	89.9	63.4	40.6	0.0	50	Mod
MHB14	58.8	73.0	63.3	27.5	0.0	45	Mod
MHB15	68.6	92.8	68.3	48.1	0.0	56	Mod
MHB16	65.6	95.5	55.8	45.9	0.0	53	Mod
MHB17	ND	ND	22.5	3.3	0.0	ND	ND
MHB18	47.1	58.0	0.0	36.1	0.0	28	Fair/Poor
MHB19	36.9	54.6	0.0	19.1	0.0	22	Fair/Poor
MHB20	30.5	60.7	0.0	8.1	0.0	20	Fair/Poor
MHB21	24.1	43.5	0.0	0.0	0.0	14	Fair/Poor
MHBMOOR	57.4	84.0	57.1	33.3	0.0	46	Mod

High Quality = >69; High/Moderate = 61-69; Moderate = 39-61; Moderate/Fair = 31-39; Fair/Poor = <31

On the basis of these data, EPA determined that station MHB16 was appropriate as a reference site where dissolved oxygen standards were met, and that a total nitrogen concentration of **0.45** mg/l (the average of 2004-05 concentrations) represents the threshold protective of the dissolved oxygen water quality standard of 5.0 mg/l. Higher TN concentrations are associated with multiple DO violations, based on the available monitoring data. EPA notes that this value is within the range of target nitrogen thresholds previously determined in southeastern Massachusetts embayments, and is also consistent with TN concentration thresholds to protect dissolved oxygen standards identified in other estuaries.[22]

ii. Allowable TN load

EPA next determined an allowable total nitrogen load from the watershed that would result in TN concentrations at or below the 0.45 mg/l TN threshold. To do so, EPA applied a steady state

[22] EPA notes that a probable range of criteria for total nitrogen "in the vicinity of 0.35 to 0.40 mg/l" is suggested in Deacutis & Pryor, *Nutrient Conditions in Narragansett Bay & Numeric Nutrient Criteria Development Strategies for Rhode Island Estuarine Waters* (2011). While this range is lower than the endpoint identified by EPA for this analysis EPA believes the site specific information supports the 0.45 mg/l target. NHDES identified a target of 0.45 mg/l TN to protect DO conditions in the Great Bay estuary, NHDES, *Draft Numeric Nutrient Criteria for the Great Bay Estuary* (2009), although that draft numeric nutrient criterion is no longer used in 305(b) and 303(d) water quality assessments in the Great Bay estuary, see Settlement Agreement and Release, NH Supreme Ct No. 2013-0119 (2014).

ocean water dilution model based on salinity, from Fischer et al. (1979). A similar approach was used by the New Hampshire Department of Environmental Services to develop loading scenarios for the Great Bay Estuary (NHDES, 2009). The basic premise is that steady state concentrations of nitrogen in an estuary will be equal to the nitrogen load divided by the total water flushing rate from freshwater and ocean water. Estuaries are complicated systems with variability due to tides, weather, and stream flows. However, by making the steady state assumption, it is not necessary to model all of these factors. The steady state assumption can be valid for calculations based on long term average conditions, which approximate steady state conditions.

Salinity data is used to determine the proportion of fresh and ocean water in the estuary. Freshwater input is calculated from streamflow measurements at USGS gages in the watershed. Then, ocean water inputs are estimated using salinity measurements and the freshwater inputs. The total flushing rate is then used with the target nitrogen threshold to determine the total allowable load to the estuary. For this calculation, salinity at Station MHB19 during 2004-05[23] was used to represent the reference location for meeting the target threshold, because it is the uppermost station that appears clearly nitrogen limited based on the Mount Hope Bay Monitoring Program data.

Freshwater Flow: Average freshwater flow input to the estuary in the summers of 2004 and 2005 is shown in Table 8. Freshwater flows at the mouths of the river is determined based on the USGS streamgage data using a drainage area ratio calculation as follows:

Flow at mouth = Flow at USGS gage * Drainage area at mouth/Drainage area at gage

Table 8. Average Freshwater Flow 2004-05

	1 Taunton River (Bridge-water) *USGS Gage*	2 Taunton River (area to mouth of estuary minus tributaries) *Drainage Area calculation*	3 Three Mile River (North Dighton) *USGS Gage*	4 Three Mile River (mouth) *Drainage Area calculation*	5 Segre-ganset River (Dighton) *USGS Gage*	6 Segre ganset River (mouth) *Drainage Area calculation*	7 Assonet River (dam) based on Segregansett	8 Quequechan River (mouth) based on Segregansett	 Total Fresh-water Flow (Sum of Columns 2 4+6+ 7+8
Drainage Area	261 sq. miles	410 sq. miles	84 sq. miles	85 sq. miles	10.6 sq. miles	14.9 sq. miles	21.9 sq. miles	30.5 sq. miles	
2004	195 cfs	306 cfs	54 cfs	55 cfs	4.4 cfs	6.1 cfs	9.0 cfs	12.6 cfs	**389 cfs**
2005	217 cfs	341 cfs	55 cfs	56 cfs	4.6 cfs	6.4 cfs	9.4 cfs	13.1 cfs	**427 cfs**

Average: **408 cfs**

Salinity: A mass balance equation is applied as follows:

Average salinity at ocean boundary (Rhode Island Sound) = 30 ppt (Kincaid and Pockalny, 2003)

[23] As discussed above, 2004-05 represent a typical year.

Average salinity at MHB19 in Taunton River Estuary for 2004-05 = 22.35 ppt

Average freshwater flow 2004-05 (Table 8) = 408 cfs

(30 ppt * X cfs + 0 ppt * 408 cfs)/(408 cfs + X) = 22.35 ppt

X = 1,192 cfs ocean water

<u>Nitrogen Target</u>: The nitrogen target load in lbs per day is calculated by combining all water inputs and multiplying by the threshold concentration and the appropriate conversion factors.

(408 cfs + 1,192 cfs)*(0.646)*(8.34)*(0.45 mg/l) = 3,879 lbs/day

The nitrogen concentration at the seaward boundary is 0.28 mg/l (from Oviatt, et al., *Annual Primary Production in Narragansett Bay with no Bay-Wide Winter-Spring Phytoplankton Bloom* (2001). The ocean load can then be calculated:

Ocean load = 1,192 cfs * (0.646)*(8.34)*(0.28 mg/l) = 1,798 lbs/day

Based on the overall flow of the estuary (average of summers 2004 and 2005), the allowable TN load to the Taunton River Estuary, including both ocean and watershed loads, is 3,879 lbs/day.[24] The load from the ocean is 1,798 lbs/day, leaving an allowable load of **2,081** lbs/day from watershed sources. As noted above, actual loads in 2004-05 averaged 4,228 lbs/day. This means a reduction in watershed loads of 2,147, or approximately 51% from the 2004-05 baseline, is required in order to meet water quality standards in the Taunton River Estuary.[25] The Brockton AWRF upgrade already completed has reduced loads by approximately 17%, which while a significant step forward is not expected to be sufficient to achieve water quality standards in the estuary without substantial additional reductions. The ongoing monitoring in Mount Hope Bay indicates that this prediction is correct; the continuous DO and chlorophyll monitoring at the Mount Hope Bay NBFSMN station indicates that high chlorophyll concentrations and accompanying DO depletions in bottom waters have continued subsequent to completion of the upgrade in 2010. See part d above for charts of datasonde data.

The required load reduction is greater than the load discharged from any single facility and can be achieved only through permit limits on multiple facilities. Furthermore, the reduction should be fairly allocated among all discharges to the estuary. EPA notes that all the wastewater treatment plants contributing to the Taunton River are due for permit reissuance, and it is EPA's intent to include nitrogen limits in those permits as appropriate, consistent with this analysis. In doing so, EPA considers not only the facility's current discharges, but their potential discharges under their approved design flows. As this analysis considers summer flows only, an estimated summer flow is calculated at 90% of design flow, consistent with the analysis done by the Rhode

[24] To provide a check on this calculation, EPA calculated the predicted TN concentration in the estuary using calculated loads from 2004-05 using the same mass balance equation. Using the calculated watershed load of 4,228 lbs/day and an ocean load of 1,803 lbs/day as calculated above, the predicted concentration in the estuary is 0.70 mg/l. The monitoring data indicates that the average TN concentration was 0.73 mg/l, within 5% of the predicted value.

[25] Ocean loads are not considered controllable.

Island Department of Environmental Management (RIDEM) for Narragansett Bay facilities. (RIDEM, 2004) See Table 9. This accounts for the fact that a facility discharging at an annual average flow equal to its design flow will average less than design flow during the drier summer months.

For purposes of allocating the required load reduction, EPA first notes that nonpoint sources are unlikely to be reduced by 51% (the overall reduction required in the estuary), and that therefore a higher proportion of the reduction will be allocated to wastewater point sources in the estuary. This is consistent with approaches in approved TMDLs in Massachusetts and elsewhere. EPA considers a 20% nonpoint source reduction to be a reasonably aggressive target for nonpoint source reduction in this watershed based on the prevalence of regulated MS4 stormwater discharges, trends in agricultural uses and population, and potential reductions in atmospheric deposition through air quality programs. EPA notes that should nonpoint source reductions fail to be achieved, permit limits for WWTPs in the watershed shall be revisited to ensure that water quality standards are met.

Using the baseline NPS load of 1,428 lbs/day from 2004-05, a 20% reduction would result in a NPS load of 1,142 lbs/day. This leaves an available load for wastewater discharges of 939 lbs/day. Of the eleven facilities discharging to the watershed, five are minor discharges (< 1 MGD) with a combined load of less than 50 lbs/day. These facilities are considered de minimis contributors for the purposes of this analysis and are not analyzed further here.

To determine an equitable load allocation, EPA first determined the permit limit that would be required to meet the allowable load if a uniform limit were applied to all facilities. While permit limits are generally set to be more stringent on larger dischargers/direct discharges to impaired waters, calculating a uniform limit allows EPA to determine the range of options for permit limits. As shown in Table 9 below, a uniform permit limit on all discharges > 1 MGD in the Taunton would have to be between 3.4 and 3.5 mg/l for the allowable loading threshold to be met. For the largest discharges such as Taunton and Brockton, therefore, a 3.4 mg/l limit represents the upper bound of possible discharge concentrations to meet the water quality requirement. For a lower bound on potential permit limits, EPA notes that the currently accepted limit of technology (LOT) for nitrogen removal is 3.0 mg/l.

Table 9. Delivery Factors and Loads under Permit Limits

WWTF	Design Flow (MGD)	Percent delivered to estuary	Limit assumption: 3.3	Limit assumption: 3.4	Limit assumption: 3.5
Taunton	8.4	100%	208	214	221
Somerset	4.2	100%	104	107	110
Brockton	18	89%	397	409	421
Bridgewater	1.44	96%	34	35	36
Mansfield	3.14	83%	65	67	69
Middleboro	2.16	92%	49	51	52
		Smaller facilities (at 04-05 loads)	46	46	46
		Total	903	929	955

Given the determination that the maximum possible limit for larger facilities is less than 4 mg/l, and that upgrades to meet the most stringent permit limits are more cost-effective at facilities with the highest flows and highest proportion of the load delivered to the estuary, EPA has concluded that a permit limit based on the LOT of 3.0 mg/l is required for the larger dischargers of nitrogen to the estuary. (Effluent limits for the smaller dischargers are calculated based on an assumption of the Taunton and Brockton facilities achieving 3.0 mg/l.)

To put this limit in context, Table 10 shows an example permitting scenario that would meet the allowable loading threshold.

Table 10. Load Allocation Scenario to Meet Load Target

WWTF	Design Flow (MGD)	Percent delivered to estuary	Potential permit limit	Load discharged (lbs/day) at 90%	Load delivered to Estuary
Brockton	18	89%	3.0	405	361
Taunton	8.4	100%	3.0	189	189
Somerset	4.2	100%	3.7	117	117
Mansfield	3.14	83%	5.0	118	98
Middleboro	2.16	92%	5.0	81	74
Bridgewater	1.44	96%	5.0	54	52
Smaller facilities (at current loads)					46
Total					937

In this particular example permit limits for the Brockton AWRF (the largest discharger), and Taunton WWTP (the second largest discharge and a direct discharger to the estuary) are based on an effluent concentration of 3.0 mg/l. Somerset WWTP (the third largest discharge and a direct discharger to the estuary) is set at 3.7 mg/l; and the remaining three facilities (Bridgewater, Mansfield and Middleborough) are set at 5.0 mg/l. Final determinations as to the permit limits on facilities other than the Brockton AWRF will be made in each individual permit issuance.

For these reasons, EPA has included a monthly average total nitrogen limit of 450 lb/day (May to October[26]) in the draft permit, which is a mass load calculated on the basis of a 3 mg/l concentration in the effluent, considered the current limit of technology, at the design flow of 18 mgd. As the water quality analysis is based on total loads to the estuary and is not affected by

[26] The May to October seasonal period is consistent with other Narragansett Bay-related nitrogen limits. See Upper Blackstone Water Pollution Abatement District, MA01002369. The Mount Hope Bay Monitoring Program did not include May and October sampling, so those months were not explicitly included in the loading analysis. However, the Narragansett Bay Fixed Site Monitoring Program extends through October and includes limited data at the end of May and supports the need for permit limits in those months. For example, in 2006 chlorophyll-a concentrations in the last week of May averaged 13 ug/l with a maximum of 25 ug/l, with an average DO at the surface sonde of less than 5.0 mg/l. In 2005, chlorophyll-a concentrations from October 1 through 5 averaged 15 ug/l, with a maximum of 45 ug/l; DO concentrations measured at the near-bottom datasonde were less than 5.0 mg/l for approximately 5% of that time. The monthly average load limit is designed to ensure that the seasonal target is met.

variations in the amount of flow from the point sources,[27] a mass load-only limit is therefore protective of water quality, and is consistent with 40 CFR 122.45(f). The permittee must also report total nitrogen concentration as well as concentration and load for the nitrogen parameters nitrate, nitrite and TKN. The sampling frequency is two times per week. The permit contains a compliance schedule for meeting the nitrogen limit (See Permit Section 1.F).

Consistent with the seasonal analysis, EPA has not included nitrogen limits for the timeframe of November through April because these months are not the most critical period for phytoplankton growth. As noted earlier, EPA is imposing a condition requiring the permittee to optimize nitrogen removal during the wintertime. The summer limits and the winter optimization requirements will serve to keep the annual discharge load low. In combination, the numeric limitations and the optimization requirements are designed to ensure that the discharge does not cause or contribute to violations of applicable water quality standards, including narrative water quality criterion for nutrients, in accordance with Section 301(b)(1)(C) of the CWA.

EPA also notes that while the permit limit was set based on standards in the Taunton River Estuary, the limit is also protective of water quality standards in Mount Hope Bay under Massachusetts and Rhode Island water quality standards. Mount Hope Bay receives much greater dilution by ocean water, so that the nitrogen concentrations resulting from Taunton River loadings will be lower in the Bay than the 0.45 mg/l being met in the Taunton River Estuary. While other loads to Mount Hope Bay (particularly the Fall River WWTP) will need to be addressed as well, the reduction in nitrogen loadings from the Taunton River will ensure that those discharges do not cause or contribute to nitrogen-related impairments in Mount Hope Bay.

7. Ammonia-Nitrogen

The draft permit also carries over the ammonia-nitrogen limits of the current permit of 1 mg/l average monthly and average weekly, and 2 mg/l maximum daily (and corresponding load limits), in the June to September period, as well as average monthly limits of 3.2 mg/l in May, 6.3 mg/l in November, and 9.5 mg/l in December to April. EPA notes that the new 3 mg/l total nitrogen limits and optimization requirements, once in effect, should be sufficient to ensure that ammonia-nitrogen concentrations are below these limits. The facility had no violations of the permit limits in the period January 2011 to December 2013. See Table 1.

8. Metals

a. Copper

The limits for copper in the existing permit were calculated based on the chronic and acute criteria set forth in the 1998 *National Recommended Water Quality Criteria*, pursuant to the MA SWQS in effect when the existing permit was issued in 2004. Since that time the Commonwealth of Massachusetts has issued, and EPA has approved, site-specific water quality criteria for copper for the Salisbury Plain River that are less stringent than the prior criteria. The new site

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[27] For example, the lowest recorded from the Brockton AWRF is approximately 12 mgd, a difference of 6 mgd from design flow conditions; this is less than one-half of one percent of the 1600 cfs in freshwater and ocean water dilution at the location of the load analysis and would not significantly change the resulting TN concentration.

specific criteria for copper establish a chronic criterion of 18.1 ug/l(dissolved, "d"),[28] and an acute criterion of 25.7 ug/l(d). The draft permit contains effluent limits of 8.5 ug/l(total recoverable "tr")(monthly average) and 10 ug/l(tr)(maximum daily). The derivation of these limits is set forth below.

In determining the appropriate effluent limitation in response to this revised standard, EPA must apply the requirements of the revised state standard, as set forth in the Mass DEP *Protocol for and Determination of Site-Specific Copper Criteria for Ambient Waters in Massachusetts,* January 2007 (the "site-specific protocol"), and the requirements of the anti-backsliding provisions of the Clean Water Act §§ 402(o) and 303(d)(4).

Site-Specific Protocol: In determining effluent limitations under the revised standard, the site-specific protocol allows for relaxation of permit limits to reflect the higher criteria only to the extent required to reflect the actual performance that the facility has been able to achieve. It states:

> [A]s part of the site-specific criteria, all reasonable efforts to minimize the loads of metals, and copper in this case, are part of the criteria revision protocol. So, the Department on a case-by-case basis will develop permit copper limits. Each determination will be based not only on the adjusted concentration resulting from the appropriate multiplier but will reflect the demonstrated level of copper reduction routinely achievable at the facility in order to minimize copper loads and thereby reduce its accumulation in the sediment.

Thus, determination of the appropriate effluent limits under the site-specific protocol requires calculating both (i) the required effluent limits that would meet the numeric criteria (criteria-based limits) and (ii) the actual effluent concentrations achieved by the facility (performance-based limits), and selecting the more stringent of the two.

Anti-backsliding: The reissuance of a permit with less stringent effluent limits must meet the requirements of the Clean Water Act's anti-backsliding provision, § 402(o), which allows relaxation of water quality based standards only if they comply with CWA § 303(d)(4), and only if the revised limit meets current effluent guidelines and will not cause a violation of water quality standards.[29] The Massachusetts antidegradation policy is set forth in 314 CMR § 4.04, providing, *inter alia*, "[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

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[28] Water quality criteria for copper are expressed in terms of dissolved metals. However, permit limitations for copper are expressed in terms of total recoverable metals in accordance with the requirements of 40 CFR § 122.45(c). As such, conversion factors are used to develop total recoverable limits from dissolved criteria. The conversion factor reflects how the discharge of a particular metal partitions between the particulate and dissolved form after mixing with the receiving water. In the absence of site-specific data describing how a particular discharge partitions in the receiving water, a default assumption equivalent to the criteria conversion factor is used in accordance with the *Metal Translator Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (USEPA 1996 [EPA-823-B96-007]). Therefore, a conversion factor of 0.960 was used to convert between total recoverable and dissolved copper concentrations. Dissolved concentrations are denoted ug/l(d), while total recoverable concentrations are denoted ug/l(tr)

[29] The anti-backsliding rule also contains a number of exceptions that are not applicable here. *See* CWA § 402(o)(2); 40 CFR § 122.44(l).

The analysis under the site-specific protocol addresses the anti-backsliding and antidegradation requirements by relaxing the copper limits to the more stringent of the limits necessary to achieve the revised criteria, or to the limits that have historically been achieved by the facility (unless the facility has historically discharged an effluent concentration lower than the current permit limits, in which those limits are retained). Because any relaxed limits will result in attainment of the site-specific criteria and not be less stringent than the facility's current performance, the facility will not be able to scale back its efforts to reduce copper concentrations in the effluent. Therefore, the less stringent limits will not have the result of exceeding the revised criteria or worsening water quality in the receiving water, and the antidegradation requirement will be met.

As set forth above, the effluent limitations are determined by calculating both (i) the required effluent limits that would meet the numeric criteria (criteria-based limits) and (ii) the actual effluent concentrations achieved by the facility (performance-based limits), and selecting the more stringent of the two. The only exception to this procedure is if the actual effluent concentration is lower than the current (non site-specific) limits, then the current limits are retained in the permit

Criteria-based calculation. The criteria-based limits are calculated based on dilution under 7Q10 conditions, assuming a receiving water concentration of 8 ug/l based on the median receiving water result reported in the WET test reports:

Calculation of acute limit for copper:
Acute criteria (dissolved) = 25.7 ug/l(d)
7Q10 flow = 0.39 mgd
Design flow = 18.0 mgd
Criteria for total recoverable copper = 25.7 ug/l(d)/0.960 = 26.8 ug/l (tr)
Effluent limit = [(18 + 0.39 mgd)*26.8 ug/l – 0.39 mgd * 8 ug/l]/18 = 27.2 ug/l

Calculation of chronic limit for copper:
Chronic criteria (dissolved) = 18.1 ug/l(d)
7Q10 flow = 0.39 mgd
Design flow = 18.0 mgd
Criteria for total recoverable copper = 18.1 ug/l(d)/0.960 = 18.85 ug/l (tr)
Effluent limit = [(18 + 0.39 mgd)*18.85 ug/l – 0.39 mgd * 8 ug/l]/18 = 19.1 ug/l

Performance-based calculation. The level of copper removal routinely achieved by the facility (i.e., the past demonstrated performance of the facility) is determined by a statistical analysis of discharge data submitted by the facility over the three-year period from January 2011 through December 2013, using the methodology set forth in the *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001 (March 1991) (Appendix E). The average monthly and maximum daily limits are based on the 95th and 99th percentile of a lognormal distribution, based on the facility's monthly average effluent data as shown in Table 11. These calculations indicate that limits based solely on past performance would result in a monthly average limit of 8.5 µg/l(tr) and a maximum daily limit of 10 µg/l(tr).

Table 11. Copper Performance Data and Statistical Analysis

Month end	mg/l	ln(mg/l)
01/31/2011	4.	1.3862944
02/28/2011	5.8	1.7578579
03/31/2011	4.	1.3862944
04/30/2011	6.3	1.8405496
05/31/2011	8.	2.0794415
06/30/2011	5.8	1.7578579
07/31/2011	5.8	1.7578579
08/31/2011	6.2	1.8245493
09/30/2011	7.5	2.014903
10/31/2011	6.8	1.9169226
11/30/2011	4.6	1.5260563
12/31/2011	2.	0.6931472
01/31/2012	6.5	1.8718022
02/29/2012	6.8	1.9169226
03/31/2012	5.8	1.7578579
04/30/2012	5.	1.6094379
05/31/2012	8.2	2.1041342
06/30/2012	5.8	1.7578579
07/31/2012	6.	1.7917595
08/31/2012	6.	1.7917595
09/30/2012	6.3	1.8405496
10/31/2012	6.2	1.8245493
11/30/2012	5.8	1.7578579
12/31/2012	5.8	1.7578579
01/31/2013	5.6	1.7227666
02/28/2013	5.	1.6094379
03/31/2013	5.	1.6094379
04/30/2013	6.2	1.8245493
05/31/2013	6.2	1.8245493
06/30/2013	6.3	1.8405496
07/31/2013	6.6	1.8870696
08/31/2013	6.	1.7917595
09/30/2013	6.8	1.9169226
10/31/2013	5.8	1.7578579
11/30/2013	5.	1.6094379
12/31/2013	5.	1.6094379
Mean of ln(data)		1.74244
Std deviation		0.239225
95th percentile	**8.465222**	2.135966
99th percentile	**9.963005**	2.298879

Resulting Effluent Limitation. As noted above, pursuant to the site-specific protocol, effluent limits will be relaxed only to the more stringent of the criteria-based or performance-based limits. In this case the performance-based limits are more stringent with respect to both the chronic and acute criteria. The draft permit therefore includes performance-based monthly average and maximum daily permit limits, as follows:

Monthly average: 8.5 μg/l(tr)
Maximum daily: 10 μg/l(tr)

b. Other Metals

EPA also reviewed analytical data submitted in connection with the Brockton WET Reports to determine whether the facility discharges other toxic metals. Data from samples of the effluent and receiving water for the period February 2011 through November 2013 are set forth in Table 12 (attachment), along with the relevant water quality criteria for each parameter. The facility discharges none of these metals at concentrations above the water quality criteria, so no limits are required.

Whole Effluent Toxicity (WET) - Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The MA SWQS include the following narrative statement and requires that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria: "All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife."

National studies conducted by the Environmental Protection Agency have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents and aromatic hydrocarbons among others. The Region's current policy is to include toxicity testing requirements in all municipal permits, while Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts.

Based on the potential for toxicity resulting from domestic sewage, in accordance with EPA national and regional policy, and in accordance with MassDEP policy, the draft permit includes acute toxicity limitations and monitoring requirements. (See *Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants*, 50 Fed. Reg. 30,784 (July 24, 1985); EPA, *Technical Support Document for Water Quality-Based Toxics Control* (September, 1991); and MassDEP, *Implementation Policy for the Control of Toxic Pollutants in Surface Waters* (February 23, 1990)). EPA Region 1 has developed a toxicity control policy which requires wastewater treatment facilities to perform toxicity bioassays on their effluents. The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measure only by biological analyses; (2) bioavailability of pollutants after discharge is best measured by toxicity testing including any synergistic effects of pollutants; and (3) pollutants for which there are inadequate chemical analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in conjunction with pollutant specific control procedures to control the discharge of toxic pollutants.

Pursuant to EPA, Region I and MassDEP policy, discharges having a dilution factor less than 100:1 (1.02 for this discharge) require acute and chronic toxicity testing and an acute LC_{50} limit of ≥ 100%. The draft permit requires the permittee to conduct four chronic and acute WET tests per year. The tests use the species, Ceriodaphnia dubia, in accordance with existing permit conditions, and are to be conducted in accordance with the EPA Region 1 Toxicity protocol found in the draft permit Attachment A for the chronic test and Attachment B for the acute test. The prior permit's use of the single "chronic (and modified acute)" test has been revised to two separate tests, consistent with the requirement to use approved test methods.

The permit also requires toxicity of an additional two samples per year, to be taken during a period when the plant's daily flow exceeds 30 mgd. These samples may be taken in any month when such flows occur. The facility had no violations of the WET permit limits in the period January 2011 to December 2013 for regularly scheduled sampling, but had two violations of the chronic limit in the two samples taken at flows over 30 mgd. See Table 1.

The chronic no observable effects concentration (C-NOEC) limit is calculated to be greater than or equal to the effluent concentration in the receiving water. The inverse of the receiving water concentration (chronic dilution factor) multiplied by one hundred is used to calculate the chronic C-NOEC as a percent limit. $(1/1.02)(100) \geq 98\%$

VII. INDUSTRIAL PRETREATMENT PROGRAM

The permittee is required to administer a pretreatment program based on the authority granted under 40 CFR 122.44(j), 40 CFR Part 403 and Section 307 of the Act. The permittee's pretreatment program received EPA approval on July 31, 1982 and, as a result, appropriate pretreatment program requirements were incorporated into the previous permit, which were consistent with that approval and federal pretreatment regulations in effect when the permit was issued.

The Federal Pretreatment Regulations in 40 CFR Part 403 were amended in October 1988, in July 1990, and again in October 2005. Those amendments established new requirements for implementation of pretreatment programs. Upon reissuance of this NPDES permit, the permittee is obligated to modify its pretreatment program to be consistent with current Federal Regulations. Those activities that the permittee must address include, but are not limited to, the following: (1) develop and enforce EPA approved specific effluent limits (technically based local limits); (2) revise the local sewer-use ordinance or regulation, as appropriate, to be consistent with Federal Regulations; (3) develop an enforcement response plan; (4) implement a slug control evaluation program; (5) track significant noncompliance for industrial users; and (6) establish a definition of and track significant industrial users.

These requirements are necessary to ensure continued compliance with the POTW's NPDES permit and its sludge use or disposal practices.

In addition to the requirements described above, the draft permit requires the permittee to submit to EPA in writing, within 180 days of the permit's effective date, a description of proposed changes to permittee's pretreatment program deemed necessary to assure conformity with current federal pretreatment regulations. These requirements are included in the draft permit to ensure that the pretreatment program is consistent and up-to-date with all pretreatment requirements in effect. Lastly, the permittee must continue to submit, annually by March 1, a pretreatment report detailing the activities of the program for the twelve month period ending 60 days prior to the due date.

VIII. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

EPA regulations set forth a standard condition for "Proper Operation and Maintenance" that is included in all NPDES permits. *See* 40 CFR §122.41(e). This condition is specified in Part II.B.1 (General Conditions) of the draft permit and it requires the proper operation and maintenance of all wastewater treatment systems and related facilities installed or used to achieve permit conditions.

EPA regulations also specify a standard condition to be included in all NPDES permits that specifically imposes on permittees a "duty to mitigate." *See* 40 CFR § 122.41(d). This condition is specified in Part II.B.3 of the draft permit and it requires permittees to take all reasonable steps

– which in some cases may include operations and maintenance work - to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment.

Proper operation of collection systems is critical to prevent blockages and equipment failures that would cause overflows of the collection system (sanitary sewer overflows, or SSOs), and to limit the amount of non-wastewater flow entering the collection system (inflow and infiltration or I/I[30]). I/I in a collection system can pose a significant environmental problem because it may displace wastewater flow and thereby cause, or contribute to causing, SSOs. Moreover, I/I could reduce the capacity and efficiency of the treatment plant and cause bypasses of secondary treatment. Therefore, reducing I/I will help to minimize any SSOs and maximize the flow receiving proper treatment at the treatment plant. MassDEP has stated that the inclusion in NPDES permits of I/I control conditions is a standard State Certification requirement under Section 401 of the CWA and 40 CFR § 124.55(b).

Therefore, specific permit conditions have been included in Part I.B. and I.C. of the draft permit. These requirements include mapping of the wastewater collection system, preparing and implementing a collection system operation and maintenance plan, reporting unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling infiltration and inflow to the extent necessary to prevent SSOs and I/I related-effluent violations at the wastewater treatment plant, and maintaining alternate power where necessary. These requirements are intended to minimize the occurrence of permit violations that have a reasonable likelihood of adversely affecting human health or the environment.

Several of the requirements in the new draft permit were not included in the current permit, including collection system mapping, and preparation of a collection system operation and maintenance plan. EPA has determined that these additional requirements are necessary to ensure the proper operation and maintenance of the collection system and has included schedules for completing these requirements in the draft permit.

Because Abington and Whitman each own and operate collection systems that discharge to the Brockton AWRF, these municipalities have been included as co-permittees for the specific permit requirements discussed in the paragraph above. The historical background and legal framework underlying this co-permittee approach is set forth in Attachment C to this Fact Sheet, EPA Region 1 NPDES Permitting Approach for Publicly Owned Treatment Works that Include Municipal Satellite Sewage Collection Systems.

IX. SLUDGE INFORMATION AND REQUIREMENTS

Section 405(d) of the CWA requires that EPA develop technical standards regulating the use and disposal of sewage sludge. These regulations were signed on November 25, 1992, published in the Federal Register on February 19, 1993, and became effective on March 22, 1993. Domestic

[30] "Infiltration" is groundwater that enters the collection system through physical defects such as cracked pipes, or deteriorated joints. "Inflow" is extraneous flow entering the collection system through point sources such as roof leaders, yard and area drains, sump pumps, manhole covers, tide gates, and cross connections from storm water systems.

sludge, which is land applied, disposed of in a surface disposal unit or fired in a sewage sludge incinerator, is subject to Part 503 technical standards. Part 503 regulations have a self-implementing provision; however Section 405(d) of the CWA requires that sludge conditions be included in all POTW permits. Domestic sludge, which is disposed of in a municipal solid waste landfill, is in compliance with Part 503 regulations, provided that the sludge meets the quality criteria of the landfill and the landfill meets the requirements of 40 C.F.R. Part 258.

The draft permit has been conditioned to ensure that sewage sludge use and disposal practices meet the CWA Section 405(d) Technical Standards. In addition, EPA-New England has prepared a 72-page document entitled "EPA Region I NPDES Permit Sludge Compliance Guidance" for use by the permittee in determining their appropriate sludge conditions for their chosen method of sewage sludge use or disposal practices. This guidance document is available upon request from EPA Region 1 and may be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf. The permittee is required to submit an annual report to EPA Region 1 and MassDEP, by February 19th each year, containing the information specified in the Sludge Compliance Guidance document for their chosen method of sewage sludge use or disposal practices.

The City of Brockton owns and operates a multiple hearth incinerator. The incinerator has the following air pollution control devices: a flue gas recirculation system, a VenturiPak wet scrubbing system and an enclosed feed screw conveyor. The City generates approximately 3,830 dry metric tons of sewage sludge annually. The resulting ash (approximately 240 dry metric tons annually) is disposed of at the Brockton AWRF Ash Landfill. Disposal of ash is not regulated by Part 503.

Subpart E of the Part 503 regulations outlines the standards for the incineration of sewage sludge. The permit contains general requirements, management practices, pollutant limitations, an operational standard, monitoring frequency, record keeping and reporting requirements implementing the provisions of the regulations. The basis of each provision is detailed below.

Pollutant Limitations:

The sludge standards regulate seven metals. The pollutant limits in the permit are based on the requirements in §503.43.

Mercury and beryllium are regulated by the National Emission Standard for Hazardous Air Pollutants (NESHAPs) found in 40 CFR Part 61. The permit requires that the firing of sewage sludge in the facility's incinerators does not cause the violation of the NESHAPs for mercury and beryllium. The NESHAP for beryllium applies to each incinerator. The NESHAP for mercury applies to the facility.

The allowable sludge concentrations for arsenic, cadmium, chromium, and nickel are calculated from Equation (5) in §503.43(d):

$$C = \frac{RSC \;\; X \;\; 86{,}400}{DF \times (1 - CE) \times SF} \qquad \text{Eq. (5)}$$

Where:

- C = Daily concentration of pollutant in sewage sludge in mg/kg of total solids (dry weight basis)
- CE = control efficiency for the incinerator - based on performance tests
- DF = dispersion factor in micrograms per cubic meter per gram per second
- RSC = risk specific concentration in micrograms per cubic meter
- SF = sewage sludge feed rate in metric tons per day (dry weight basis)

The parameters, with the exception of RSC, are site specific to the Brockton's incinerator. The RSC is derived for each pollutant based on a risk assessment.

The RSC is the allowable increase in the average daily ground level ambient air concentration for a pollutant above background levels that result from the firing of sewage sludge in an incinerator. It is equivalent to the amount of a pollutant that a person living near the incinerator can inhale with a probability of 1 in 10,000 that the person will contract cancer as a result of inhaling the pollutant. The RSC was calculated from the equation below, which is found in the *Technical Support Document for Sewage Sludge Incineration* (EPA 822/R-93-003, November 1992):

$$RSC = \frac{RL \;\; X \;\; BW}{Q^{*} \;\; X \;\; I_a} \;\; x \;\; 10^3$$

Where:

- RL = Risk Level, 10^{-4}
- BW = body weight, 70 kg (154 lbs), this is the average weight of an adult male
- Q^* = allowable dose of a pollutant from EPA's Integrated Risk Information System database
- I_a = inhalation rate, 20 m/day, normal inhalation rate for an adult male.

The RSC calculated from this equation is intended to protect the "Highly Exposed Individual" (HEI). The HEI is a person who remains for an extended period of time, 70 years, at the point of maximum ground level pollutant concentration. The RSC values for the regulated metals are found in Tables 1 and 2 of § 503.43 and are presented below.

Pollutant	RSC (ug/m^3)
Arsenic	0.023
Cadmium	0.057
Chromium	0.65*
Nickel	2.0

*Chromium RSC based on fluidized bed with wet scrubber

The sludge feed rate, dispersion factor and control efficiency (based on performance stack test) are:

Sludge Feed Rate: 189 dry g/sec = 16.3 metric tons/day
Dispersion factor: 11.1 ug/m^3/g/sec

Pollutant	Control Efficiency (%)
Arsenic	98.5
Cadmium	98.3
Chromium	99.9
Lead	99.9
Nickel	99.3

Based on the above parameters, the concentration limits for each pollutant are calculated below using Equation (5) in §503.43(d):

Pollutant	Limit (mg/kg)
Arsenic	732
Cadmium	1,601
Chromium	310,396
Nickel	136,438

The pollutant limit for lead is calculated using equation (4) of §503.43:

$$C = \frac{0.1 \times NAAQS \times 86{,}400}{DF \times (1 - CE) \times SF} \qquad \text{Eq. (4)}$$

Instead of using an RSC, a percentage of the National Ambient Air Quality Standard (NAAQS) for lead was used. The NAAQS for lead (1.5 ug/m^3) is found in 40 CFR § 50.12. Although lead is classified as a probable human carcinogen, the Clean Air Science Advisor Committee of the Science Advisory Board recommended that the NAAQS for lead be based on the noncarcinogenic effects. Developmental neurotoxicity is considered to be the most sensitive end point for lead exposure. The calculated concentration from equation (4) shown below also protects the HEI described above.

Pollutant	Limit (mg/kg)
Lead	71,630

The limits for arsenic, cadmium, chromium, and lead are less stringent than in the 2005 permit and the limit for nickel is more stringent. EPA has determined that these newly-developed limits are in accordance with antibacksliding exceptions found at 40 CFR § 122.44(l)(i)(A) & (B)[Material and Substantial Alterations & New Information]. After the 2005 permit was issued, the incinerator underwent a significant upgrade (including the construction of a new VenturiPak wet scrubbing system, a flue gas recirculation system, and an enclosed sludge feed screw conveyor. Subsequent to that upgrade, modeling and stack testing has provided new information used herein. For both of these reasons, the limits developed above are applied in the draft permit. Monitoring data submitted by the facility in the 2011 permit reapplication indicates that the facility should not have any problem complying with these limits.

Operational Standard:

The Part 503 regulations have an operational standard for total hydrocarbons (THC). Hydrocarbons are simple organic compounds containing carbon and hydrogen. The standard is designed to regulate organic emissions from sewage sludge incinerators. Total hydrocarbons represent a subset of organic compounds and is used in the regulation since it is impractical to attempt to monitor sludges or stack emissions for all organic compounds which may be present.

The THC value must be corrected to seven percent oxygen and zero percent moisture. The correction to seven percent oxygen is used because seven percent is the standard amount of oxygen used to reference measurements of pollutant limits expressed as concentration; it is also equivalent to 50 percent excess air (excess air is air added to a system above the amount of air needed for complete combustion to occur); and without the correction, inaccurate readings may occur because the presence of the additional oxygen may dilute the THC reading. Similarly, the correction for moisture is needed since the presence of moisture can also dilute the actual THC reading. THC is conventionally expressed in terms of a dry volumetric basis, hence the need to set the standard based on zero moisture.

On February 25, 1994, §503.40 was amended. The amendment allows facilities to monitor carbon monoxide (CO) instead of THC. A facility can monitor for CO if the facility can meet a monthly average concentration CO limit of 100 parts per million on a volumetric basis. This limit, like the THC limit, is corrected to seven percent oxygen and zero percent moisture. The City of Brockton monitors THC.

Management Practices:

The permit contains management practices based on §503.45. They pertain to the operation of the incinerator. The management practices include maintaining the instruments which monitor CO, oxygen and temperature; proper operation of all air pollution control devices; and notification to EPA when the continuous monitoring equipment is not operational for a period of 72 hours or more.

The permit requires notification to EPA and the state if any monitoring equipment is broken or shut down for longer than 72 hours. It also prohibits adversely affecting a threatened or endangered species or their critical habitat. There are no known threatened or endangered species within the vicinity of the incinerator. Therefore, EPA has determined that the activity will not affect a threatened or endangered species.

The monitoring frequency is based on §503.46. The permittee is required to monitor heavy metals 6 times per year. The monitoring for mercury and beryllium is at the frequency required by 40 CFR Part 61. The record keeping requirements are based on §503.47.

X. UNAUTHORIZED DISCHARGES

The draft permit authorizes discharges only from the outfalls listed in Part I.A.1 of the permit, in accordance with the terms and conditions therein. Discharges of wastewater from any other point sources are not authorized by the permit and shall be reported as set forth in Part I.B. in accordance with Section D.1.e. (1) of the General Requirements (Part II) of the permit (Twenty-four hour reporting).

XI. ENDANGERED SPECIES ACT

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, or plants to determine if any listed species might potentially be impacted by the re-issuance of this NPDES permit. EPA has determined that no federally-listed or proposed, threatened or endangered species or critical habitat are known to occur in the Salisbury Plain River. Furthermore, the effluent limitations and other permit requirements identified in this Fact Sheet are designed to be protective of all aquatic species, and permit limits on total nitrogen have been included to protect the downstream waters of Mount Hope Bay and the Taunton River Estuary. Therefore EPA has determined that a consultation with USFWS and NMFS is not required.

XII. ESSENTIAL FISH HABITAT

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA’s action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species’ fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The Salisbury Plain River is not covered by the EFH designation for riverine systems, and permit limits on total nitrogen have been included to protect the downstream waters of Mount Hope Bay and the Taunton River Estuary. Therefore EPA has determined that a formal EFH consultation with NMFS is not required.

XIII. MONITORING AND REPORTING

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308 (a) of the CWA in accordance with 40 CFR §§122.41 (j), 122.44 (l), and 122.48.

The Draft Permit includes new provisions related to Discharge Monitoring Report (DMR) submittals to EPA and the State. The Draft Permit requires that, no later than six months after the effective date of the permit, the permittee submit all monitoring data and other reports required by the permit to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request").

In the interim (until six months from the effective date of the permit), the permittee may either submit monitoring data and other reports to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated CWA permittees to submit discharge monitoring reports (DMRs) electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr. Further information about NetDMR, including contacts for EPA Region 1, is provided on this website.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To participate in upcoming trainings, visit http://www.epa.gov/netdmr for contact information for Massachusetts.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

EPA has become aware that the requirement to submit reports as electronic attachments to DMRs using NetDMR has created confusion as to report due dates, as the report due dates generally differ from the DMR due date (the 15th of each month) and NetDMR does not allow submission of a report without a concurrently submitted DMR. Therefore, to assist in electronic reporting, EPA has added language to the Final Permit (Section I.G.1.a) stating that any report required under the permit shall be considered timely so long as it is electronically submitted with the next DMR submitted by the permittee following the permit report deadline.

The Draft Permit also includes an "opt-out" request process. Permittees who believe they can not use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt-outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs and reports to EPA using NetDMR, unless the permittee submits a renewed opt-out request sixty (60) days prior to expiration of its opt-out, and such a request is approved by EPA.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the Draft Permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs must be postmarked no later than the 15th day of the month following the completed reporting period.

XIV. STATE PERMIT CONDITIONS

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the MassDEP Commissioner.

XV. GENERAL CONDITIONS

The general conditions of the permit are based primarily on the NPDES regulations 40 CFR §§122 through 125 and consist primarily of management requirements common to all permits.

XVI. STATE CERTIFICATION REQUIREMENTS

EPA may not issue a permit unless MassDEP certifies that the effluent limitations included in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State water quality standards, or waives certification. EPA has requested permit certification by the State pursuant to 40 CFR §124.53 and expects the draft permit will be certified.

XVII. COMMENT PERIOD, HEARING REQUESTS, AND PROCEDURES FOR FINAL DECISIONS

All persons, including applicants, who believe any condition of the permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period to Susan Murphy, U.S. Environmental Protection Agency, 5 Post Office Square, Suite 100 (OEP06-1), Boston, MA 02109. Any person prior to such date may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after the public hearing, if held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and to each person who has submitted written comments or requested notice.

XVIII. EPA CONTACT

Requests for additional information or questions concerning the draft permit may be addressed Monday through Friday, between the hours of 9:00 a.m. and 5:00 p.m., to:

Susan Murphy
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109
Telephone: (617) 918-1534 Fax: (617) 918-0534
Email: murphy.susan@epa.gov

Claire Golden
Massachusetts Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887
Telephone: (978) 694-3244 Fax (978) 694-3498
Email: claire.golden@state.ma.us

Ken Moraff, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

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